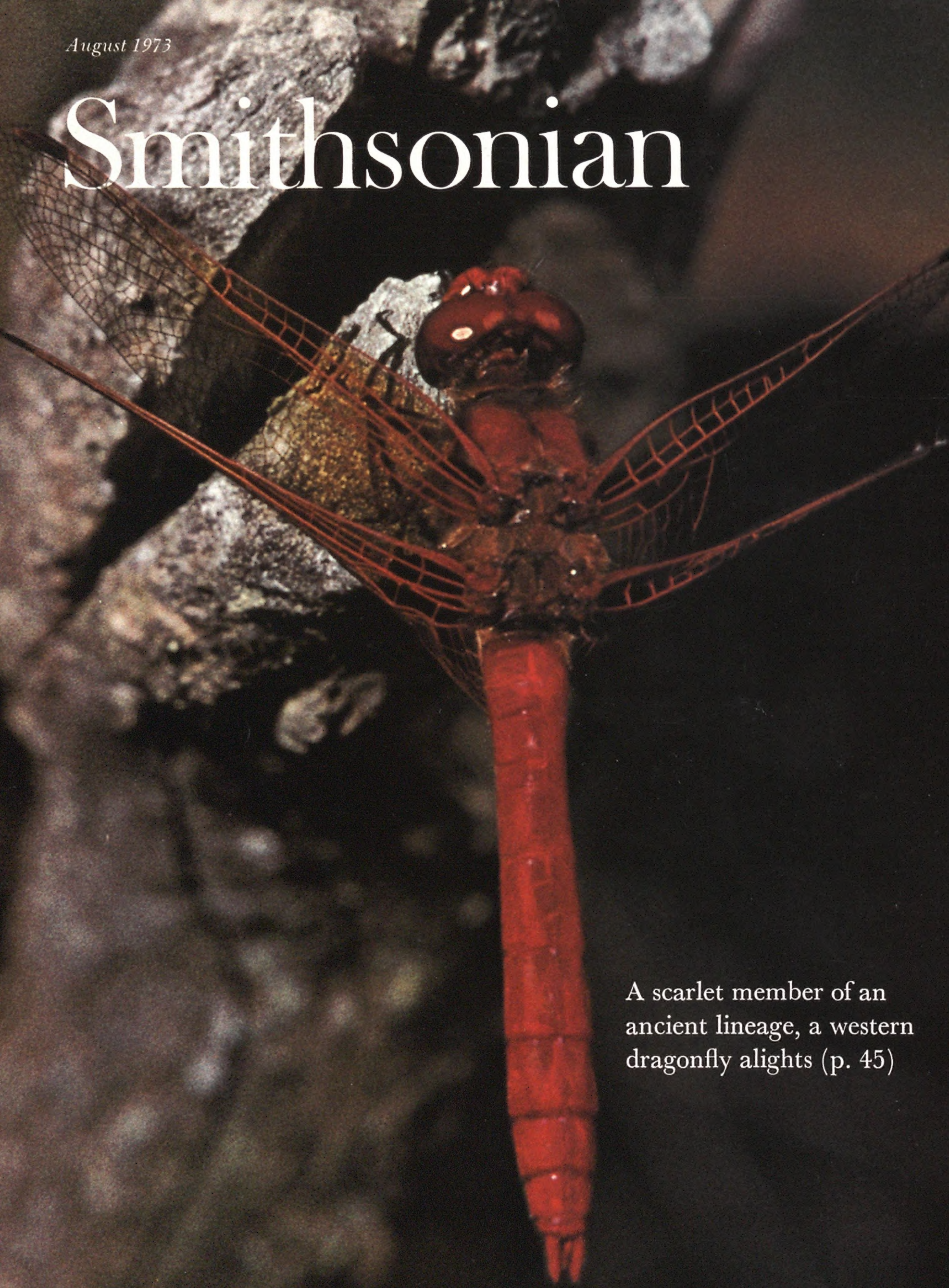
August 1973

Smithsonian



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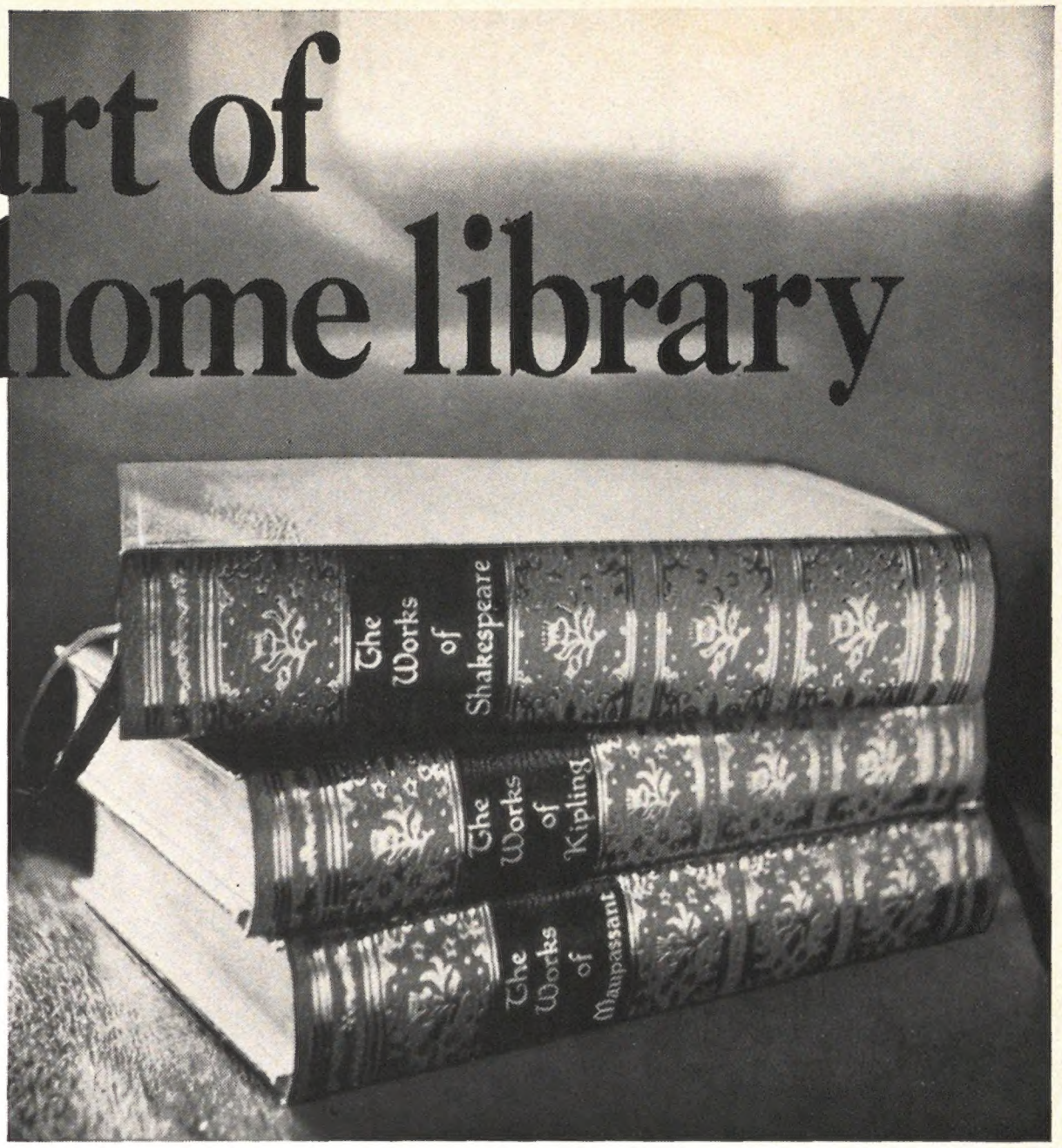

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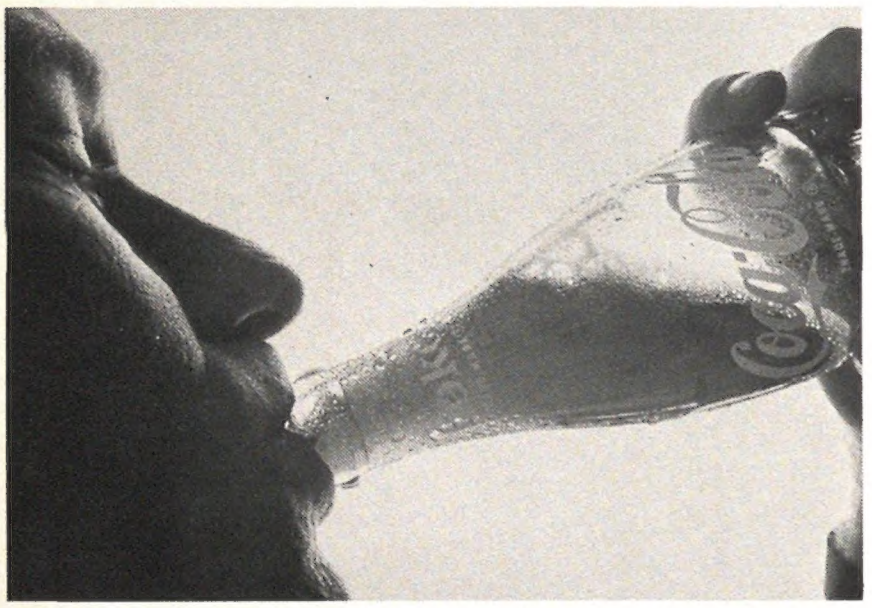

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Smithsonian

Volume 4, Number 5

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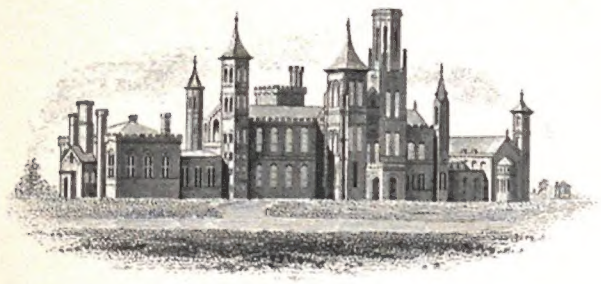
The view from the castle



Recent Smithsonian Sea-Link *tragedy grieves us, but does not deter the Institution from continuing with vital undersea research*

The tragic accident which befell the Smithsonian submarine, the *Johnson-Sea-Link,* and cost the lives of Clayton Link and Albert Stover, gives pause to all concerned with undersea exploration. But the Institution can only reaffirm its support of the research program the little vessel was carrying out, and its belief in the skill not only of Edwin A. Link and his partner, J. Seward Johnson, but in its team.

Ed Link has become as famous in oceanography as he had been in aerodynamics, where he is best remembered as the inventor of the Link Trainer. He designed and constructed his miniature submarine with great technological skill and infinite care, incorporating superb safety devices which were rigorously backed up. And he has continuously modified the little craft to improve the safety factors.

A year ago in March, totally unversed in such operations, I made a test dive in the *Johnson-Sea-Link* to demonstrate to myself its manner of operation and the safety of its performance. I examined it on the deck of the mother ship, noting the lock-out chamber astern, fitted out for men in diving suits, the independent air and chemical life-support systems, the intercom and the sophisticated motor, communication and pressure-control panels. Then, sitting in the forward compartment, a huge acrylic bubble with its own life system, I felt a thrill of excitement as we were swung out over the side of the mother ship and towed to our diving station off a coral reef.

There was a rapid change from churning surf to stillness as we sank beneath the surface. Suddenly fish darted in all directions or ventured close to inspect the pilot and myself in our great air bubble. We slowly forged ahead toward the aqueous bloom of the reef edge. As we hovered 80 feet down, as delicately as a butterfly testing milkweed, Link emerged from the lock-out chamber and swam about with his lung attachment. He spoke to me on the intercom as he picked up shells and pieces of coral.

We drifted down through darker depths, then after a two-and-a-half-hour cruise returned to the surface. The ease and precision of the operation astonished me. All augured well for the future, I decided.

But in any probing of a strange environment, Man must face danger, no matter how complete his precautions. One of my predecessors, Secretary Samuel P. Langley, risked the life of his pilot, Charles Manly, when his "aerodrome" failed to get into the air over the Potomac River in 1903. Yet what Professor Langley learned added to our knowledge of flight. Other tragedies were suffered by the United States and the Soviet Union in our exploration of space.

It was inconceivable that the *Johnson-Sea-Link's* safety features could not meet any situation, yet two fine men died: one a veteran of more than 20 years in submarines and, ironically, an expert in undersea rescue; the other, poignantly, the inventor's own son. Yet, again, knowledge has been gained.

The Institution is deeply grieved, but its oceanographic programs, using submersibles, are just beginning. So we join the Link team in looking forward to years of research to help illuminate the problems of the oceans and of Man's place in the undersea world.

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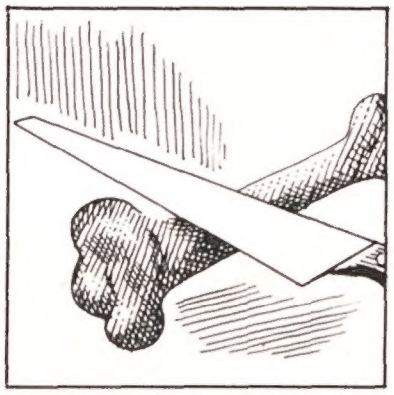
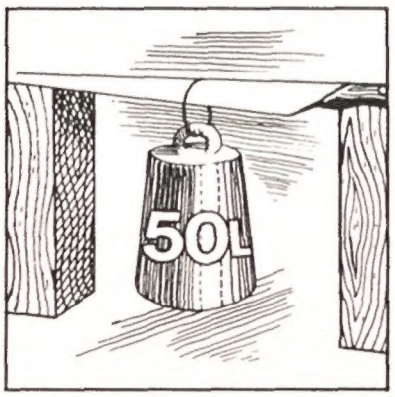
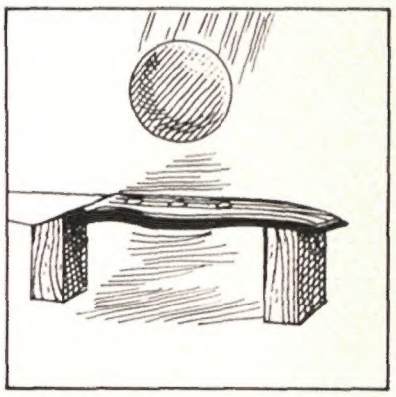


Tried to ruin edge — rasped it against a bone 20 times. Did so little to "miracle hardened" edge—its sharpness could be restored just by rubbing it over the back of a china plate.

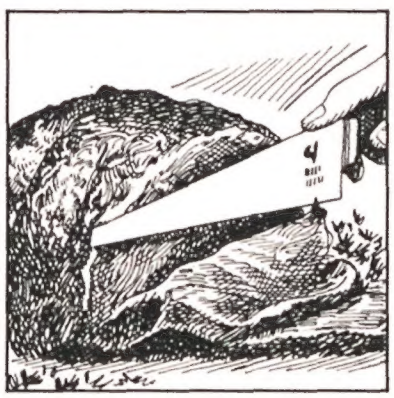
Tried to break the blade—put 20 pounds of weight on the end of the blade—bent it at 45° angle. Nothing happened to the "miracle hardened" blade.



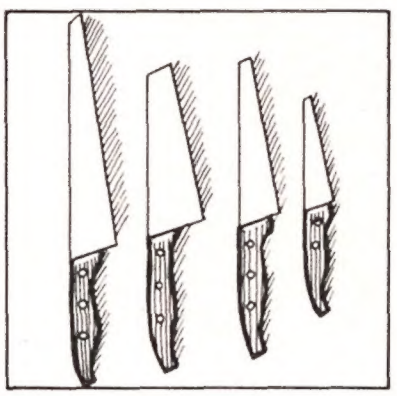
Tried to break the knife by snapping—hung 50 pound weight there—nothing happened to the miracle-hardened blade.



Even tried to break the handle—dropped one pound weight from 6 feet on the handle — nothing happened to it.



So unique — this "miracle hardened" blade, can slice thin, even if you can't. So unique, can restore sharpness just by rubbing over china plate.



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Phenomena, comment and notes

Of mice and men—and mosquitoes, the sad state of fire fighting, old scientists and tool-using blue jays

Blue jays, rude and slovenly but at least well-dressed, also are clever. Just how clever has been shown by two psychologists at the University of Massachusetts, Thony B. Jones and Alan C. Kamil.

A northern blue jay in their laboratory was seen on several occasions to rip a piece of newspaper from the pages kept beneath its cage, crumple it up and then thrust it between the wires of the cage, raking in food pellets that were too far away to be reached by beak alone. Given other objects—a piece of straw or plastic bag tie—the jay did the same.

When there were no pellets to be garnered, the jay would occasionally drop a piece of paper into the water dish, sweep it around the food can, picking up food dust in the process, and then pick off the food dust or simply eat the piece of paper.

When subsequently tested, only one of eight other jays in the psychologists' hand-reared colony showed no sign of such tool-using behavior. They suggest, in *Science* magazine, that one jay chanced "serendipitously" upon the utility of this behavior and the others learned it from observing the lucky pioneer. In any event, although jays are not known to behave this way in the wild, they can now be placed alongside the few other animals—chimpanzees, baboons, Galápagos woodpeckers and humans—which use tools.

Blue jay employs paper "tool" to get food.

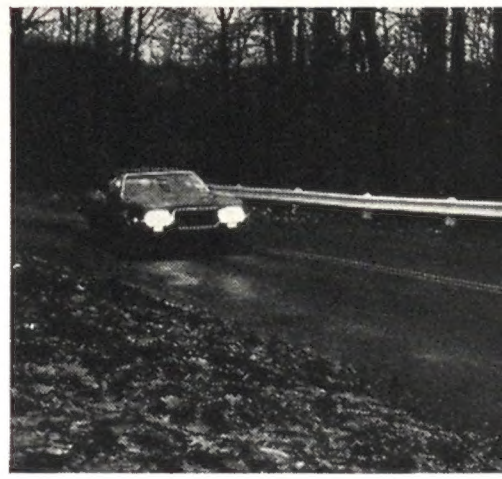
Is crowding bad for you?

Many people who worry about society often point to John Calhoun's famous experiment in which overcrowded mice exhibited increasingly pathological behavior until the population lost even the capacity to reproduce itself. But are overcrowded people anything like overcrowded mice?

Two biologists at the University of Pennsylvania looked into the problem of population density and human health and reported their findings to *Nature*. Robert M. Factor and Ingrid Waldron selected ten areas of Chicago which varied in density from about 12,000 to about 20,000 persons per square mile, but where such socioeconomic factors as income, age and education were relatively close. They found that population density was *not* correlated with health and mortality.

But the statistics did show that higher density is associated with high juvenile delinquency and high mental hospital admissions. This, say the biologists, may be less a result of high density *per se* than of a high-density "syndrome" that includes more multiple unit dwellings, less home-ownership and greater transience. (The authors refer to an earlier study which showed that in apartments in Hong Kong, those living above the ground floor had "higher hostility scores and more psychosomatic symptoms.")

In light of the noncorrelation between density and mortality, the biologists recommend that health improvement efforts



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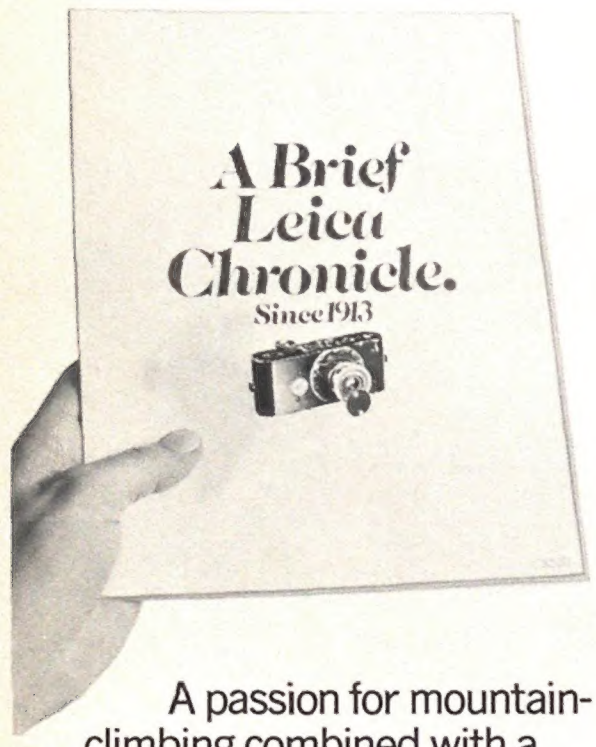

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should focus not on crowding but on "more well-established problems" like poverty, education for the poor and medical care. But in the light of their other findings, many people will continue to regard the recent death of the last mouse in Calhoun's sad colony as a mini-rehearsal for doomsday.

The aging researcher

One occasionally hears that of all the scientists who have ever lived, some 90 percent or more are alive today. So one can safely assume that an enormous fraction of all of the world's scientists are over 35 years of age. And that is a major problem, if you believe Dr. David Budworth, a British specialist in industrial research management, who recently issued (in *New Scientist*) a stern warning about the old scientist.

In short, Dr. Budworth says that except for a very few with "outstanding aptitude," most research scientists are washed up by their mid-thirties. Too much research experience, he says, tends to prevent new thoughts, and as new scientific techniques and ideas arise (as they do very quickly these days), it is easier to bring in young people with new skills than to retrain the old.

The analogy with professional athletes comes quickly to mind. Most baseball players, for example, have brief careers on the diamond, while a few seem to be effective indefinitely, like Hank Aaron who is now nearing Babe Ruth's home-run record. A small number become managers and coaches, but there are few such administrative posts available (and as in science, the bloom seems to be off: The major leagues probably will not expand much further). One hesitates to take the analogy too far, in fear of seeing distinguished young scientists at the height of their powers appearing on television to endorse razor blades (or chemistry sets), but something clearly has to be done.

Mosquito alarm

"Mosquito control today is in a state of crisis." Hard as it may be to believe, that is the blunt assessment of the National Academy of Sciences. Malaria, filariasis, yellow fever and dengue—and a host of other mosquito-transmitted diseases—remain very serious problems in many parts of the tropics and elsewhere. For exam-

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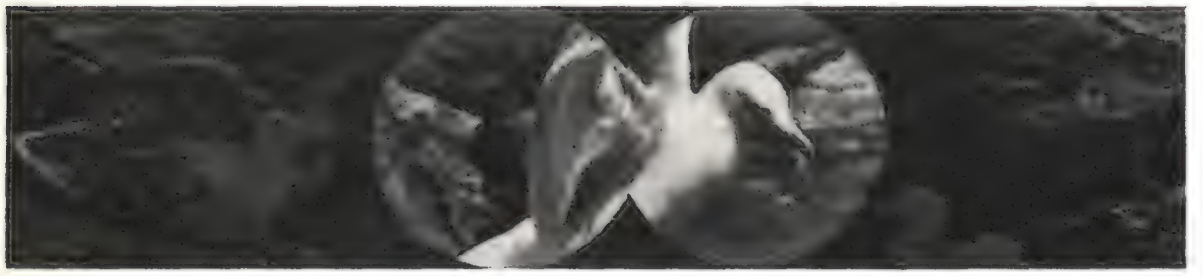

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ple, there are 100 million cases of malaria (and 1 million deaths) each year, making it probably the most prevalent disease in the world.

For the past 30 years, says an NAS panel report, *Mosquito Control: Some Perspectives for Developing Countries,* we have depended almost entirely on synthetic chemical insecticides. Not only have these caused serious environmental side effects, but "effective chemical weapons are vanishing. . . ." The pests have developed resistance to most of the available chemical agents. Nor is it merely a problem in developing countries. The panel cites the example of encephalitis-transmitting mosquitoes in some areas of California that are now "resistant to virtually all larvicides."

What is called for is a systems analysis approach, a great deal of ecological research and the development of several promising biological control techniques, of which the panel reviewed nine. Biological control, says the panel, is a "well publicized but undersupported approach to disease control." But it would seem that little more help will be immediately forthcoming from the United States, preoccupied as it is (at least budgetarily) with cancer and heart research.

Mountain-born twisters

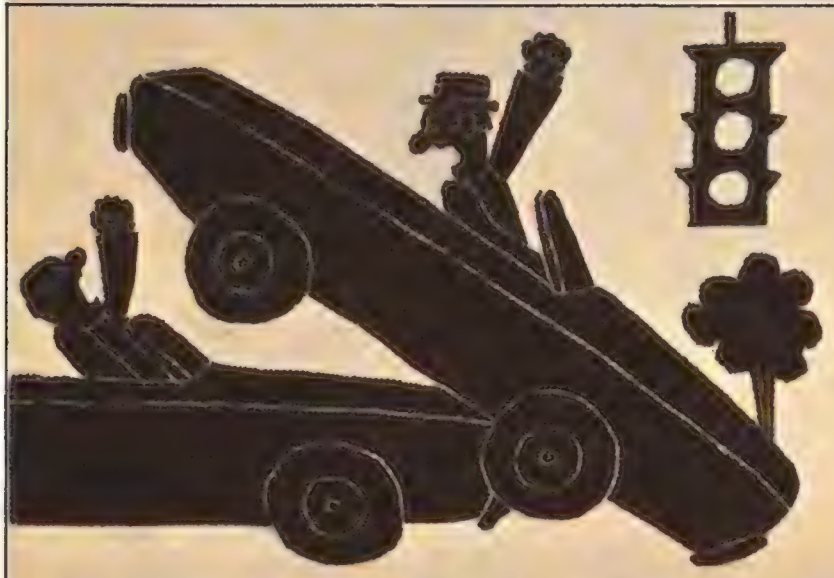
If you have had the impression that this year has been a particularly bad one for tornadoes, you are absolutely correct. In the first five months of 1973, according to *Science News,* there were 705 tornadoes in the United States, and that is close to the record number for a whole year (928 in 1967). Why so many?

The answer lies in the Himalaya mountains, of all places. The National Weather Service says all those tornadoes are the fault of the subtropical jet stream which arises in the Himalayas and was particularly strong this year. It carried "disturbances in its high, fast winds into the United States from the southwest"; the disturbances pulled warm air northward from the Gulf of Mexico and the difference in direction of the two winds, when both were strong enough, supplied the twisting movement. The weathermen could see the tornado weather coming from as far away as Asia, but predicting exactly where and when a tornado will materialize is another matter. The National Oceanic and Atmospheric Admin-

Will everyone who thinks auto insurance costs too much please stand up?

America needs action on No-Fault

Now's your chance to be heard. State legislatures are convening and they're the ones who decide the kind of auto insurance you live with. Many have already scheduled discussions of No-Fault laws.



What's No-Fault? Simple. Accident settlements are based on *loss* instead of *blame*. Your insurance company pays your actual medical costs, lost wages, other economic loss. The other driver's company pays his. It's fast and fair. Lawsuits to decide fault are eliminated. So money is saved.

It works, too. For example, a No-Fault law became effective in Massachusetts in 1971. The first year alone saved car owners more than $61,000,000 on the cost of their auto insurance.

You'd expect an idea this good would spread fast, but only a few states have done anything about it. Where the law is strong and eliminates most lawsuits, insurance costs have come down. When the law doesn't reduce lawsuits, little is saved.

Most states have not acted at all.

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We at Exxon believe the OIC is one of the most effective groups around for training the disadvantaged for meaningful jobs and then getting them placed in one. For example, the OIC is running this station in Camden, New Jersey, as a training center. The students here learn everything from pumping gasoline, to taking an engine apart and rebuilding it, to running a business. At the same time, the students are encouraged to continue their education at both the high school and college levels. And when they complete their training, the OIC will help place them in jobs. Jobs with a future.

Exxon made this station available to the OIC as a job training center and we've underwritten many of the costs. We think it's one of our best investments.

istration is experimenting with two "promising" techniques: using radio receivers to listen for the radio noise which tornadoes emit, and observing wind systems by means of Doppler radar (which works on the same principle as radar speed traps on the highways).

Fire!

As far as accidental death is concerned, in the United States the only thing that is worse than automobile accidents and falls is fire. It claims 12,000 lives annually and costs the nation at least $11.4 billion a year, according to *America Burning!*, the recently released report of the National Commission on Fire Prevention and Control. Yet the business of fire fighting remains in the 19th century.

The only "obvious change," writes a management consultant, Alan L. Frohman, in *Technology Review,* is that an internal combustion engine brings the fire truck to the scene instead of horses. Not surprisingly, fire fighting is the most dangerous profession of all. The root causes of all this, says the Commission, are "ignorance and indifference."

The limited market for fire-fighting innovations leads to few of them. Fire departments, even big ones, tend to be parochial and unaware of such new techniques and equipment as do come along. Indifference stretches from the federal government, through builders who design minimally fireproof buildings and manufacturers who produce minimally fireproof materials, to the ultimate "consumer"—the citizen. Do you, for example, have a fire extinguisher anywhere near those old rags in the cellar?

The Commission report, available from the Government Printing Office, will soon be the basis for what appears to be long overdue legislation.

The last wild bison

The only wild survivors in the U.S. of the mass extermination of bison in the last century are once again under the gun. Free-ranging inhabitants of Yellowstone National Park, they are considered a threat by one governmental department and a national treasure by another.

The Agriculture Department has set itself a goal of totally eradicating the bovine form of brucellosis—a bacterial disease sometimes called undulant fever—

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from the United States by the end of 1975. In an expensive program, livestock and other domestic animals are being tested and the infected animals destroyed.

Bison are bovines and brucellosis has been found in the blood of the Yellowstone herds, but Interior has so far withstood the demands that the disease be eradicated from their bison. Mary Meagher, a research biologist at the park, outlined some of the reasons in *Bioscience,* including the following:

The bison carry the disease organism but don't show the symptoms, suggesting an immunity from long association.

The chance of bison transmitting the disease to cattle adjacent to the park boundaries is extremely remote, she says, because bison like it where they are in the park and rarely venture out. There are, indeed, no records of brucellosis in nearby cattle for more than ten years.

The basic eradication method is to trap the animals, test them and destroy the infected ones. Animals that cannot be trapped would be destroyed. Says Ms. Meagher, trapping would change the natural habits of this last undomesticated, naturally regulated bison population, thereby reducing the pleasures of park visitors (not to mention the bison). Worse, she estimates that 80 percent of the bison would have to be destroyed because they cannot be trapped. Bison are wary—and with some justification.

Happily endangered

It can be an occasion for hope when an animal is placed on the U.S. Interior Department's endangered species list (since this is likely to increase protective efforts), but it would hardly seem to be an occasion for joy. Yet something like joy must have been the emotion of those who recently listed the eastern cougar and the Rocky Mountain wolf as officially endangered. Prior to reclassification, they were extinct—a case of moving out of the fire into the frying pan.

Discriminating artists

Two animal behaviorists of Cambridge, England, studied 1,474 European portraits painted in the past 400 years. They report (in *Nature*) that 900 show more of the left cheek than of the right, but offer no conclusive explanation, either for this phenomenon or for why they studied it.

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Letters to the Editor

Democratizing the American diet

Dear Sir: Among the numerous interesting historical aspects of Daniel J. Boorstin's article in the June issue, "How we democratized the American diet from salt fish to frozen berries," I think Swift should not have been singled out for initiating the refrigeration car service for transporting meat. In the early 1880s the Marquis de Morès, in collaboration with the Northern Pacific Railroad, had several cars constructed and shipped meat from his packing plant at Medora, North Dakota, to Chicago. It is my recollection that these were the first such cars.

As an academic horticulturist, I think more credit might have been given to the alert commercial seed houses, such as Peter Henderson of New York, Henry Dreer, W. A. Burpee and Stokes of Philadelphia, Bolgiano of Baltimore and others.

During the last 60 years, practically all new vegetable varieties have been derived from the vegetable breeding programs of the U.S. Department of Agriculture and a number of the State Agricultural Experiment Stations.

Harvey O. Werner
Professor of Horticulture, Emeritus
University of Nebraska
Lincoln, Nebraska

As the article stated, "The leading roles were played by two Americans, a Swift and an Armour who . . . became household names in every corner of the continent and in the far corners of the world." Swift was delivering meat to the East via refrigerator car in 1881; Northern Pacific Refrigerator Car Company of the young French nobleman, the Marquis de Morès, did not start operation until 1883. We agree about the importance of experimental vegetable breeding. Ed.

Dear Sir: One of Dill Cole's drawings for the Boorstin article is captioned, "Today's Americans feast souls as well as stomachs. . . ." It shows three zombies hypnotized by the boob tube, compulsively eating expensively packaged air, and seeing vacuity. I trust you are kidding.

W. A. Rice
Alliance, Ohio

Yes, oh us kidders. Ed.

Dear Sir: Dr. Boorstin's article delighted and informed me. To top it off, artist Cole portrayed for me an unexpectedly amusing meaning of "dressed hog." His penetrating drawing of the great American family, "feasting" in front of the TV set, requires no comment.

Sherwood B. Seeley
Marco Island, Florida

Joseph Henry Medal

Dear Sir: The Board of Regents has unanimously awarded you the Henry Medal of the Smithsonian Institution. The resolution follows:

> Voted that the Board of Regents approves the award of the Henry Medal and an honorarium in the amount of $1,000 to Edward K. Thompson in recognition of his brilliant efforts to create and sustain the quality of the magazine SMITHSONIAN.

S. Dillon Ripley
Secretary, Smithsonian Institution

The editor believes that he and his colleagues usually should be anonymous, identified mainly by their product. Still, he believes that note should be taken that the distinguished citizens who comprise the Board of Regents (see p. 3) think well of the magazine in awarding the Joseph Henry Medal, named after the first secretary, for only the fourth time since it was minted in 1879. It is the top award of the Institution and its presentation gave the editor the opportunity to say what he considers important:

". . . The magazine's current level is the product of a small but highly professional and imaginative staff. . . . Its members have most of the good ideas, do the difficult work of rendering some submissions into accurate and understandable English and help produce the graphic material. So, I accept the citation on behalf of this staff."

The Joseph Henry Medal (gold, actual size)

Conversation Pieces

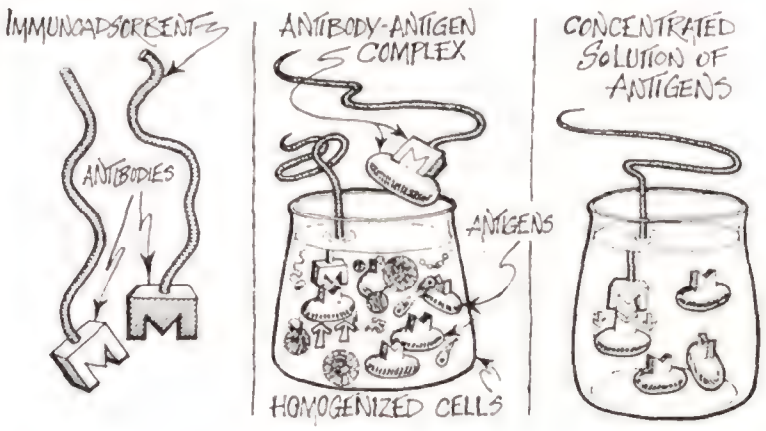
Technically intriguing items from TRW, guaranteed to add luster to your conversation and amaze your friends.

Disarming a Virus You, a teenager with mononucleosis, and an African girl with a cancer called Burkitt's lymphoma have one thing in common. Your cells very likely contain a "living molecule" called the Epstein-Barr virus (EBV). But you are in no danger, the teenager will recover from a long and exhausting illness, and the African child may die. Why?

Viruses and cancer are frequently associated, but we don't know much about their exact relationship. Is cancer caused by the virus or by a combination of factors? What makes people react differently to the same virus?

We know that when an organism fights disease it produces antibodies which travel through its bloodstream combining with and deactivating the foreign chemicals, called antigens. But antigens are not only viruses or virus products. The virus-transformed cells themselves make antigens which can cause or contribute to their destruction. When cells are invaded by EBV, five different antigens may be formed.

To best study the properties of antigens, we must separate them from all the other materials found in cells. One way is to use immunoadsorbents, long-chain molecules to which EBV antibodies have been chemically attached. EBV-infected cells are homogenized and the immunoadsorbent is immersed in the mixture. The antigens cling to the antibodies and when the immunoadsorbent is removed, the antigens come with it. The antigens are then freed from the immunoadsorbent and concentrated.



Scientists at the National Cancer Institute hope to isolate EBV antigens and those of other cancer-associated viruses. These antigens could be used to produce serums which would be catalogued and stored in a serum bank. Each serum would contain the antibody to one specific antigen.

TRW researcher Dr. Norman Weliky has been perfecting the immunoadsorbent technique for the National Cancer Institute. His group has prepared a highly purified serum against a mouse leukemia virus, and is now working on EBV-associated antigens. Their work is a small but important step toward the solution of the cancer-virus mystery.

Boomerang Have you ever considered how many hazardous chemicals get into our environment via their containers alone? Paint residues left in the cans and carted to your local dump add 32,700 pounds of mercury, 4.4 million pounds of lead, and 1 million pounds of chromium to the earth and water each year. And what about the packages that held pesticides like dieldrin and herbicides like 2,4-D? How do you clean the solvent that washed the can that contained the powder that killed the bugs that ate the wheat that farmer Jack grew?

The Environmental Protection Agency realized that we don't know enough about hazardous chemicals and their disposal. For instance, mankind has been using the oceans as an ultimate disposal site for centuries without knowing the effects of waste materials on the ocean environment.

TRW Systems was asked to help. In a year of investigation we have compiled and studied a rouges' gallery of over 500 chemicals which are highly toxic, persistent, extremely flammable or explosive, or radioactive. We have also recommended ways of dealing with these ecological menaces, usually by breaking them down completely or isolating them from the environment.

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Lear's steam engine

Dear Sir: In William Childress' article on William Lear, he attributed the death of the Doble Steam Motor Company to "excessive fuel consumption." Actually, the principal factor was the Depression. Not too many people could afford an automobile that cost anywhere from $8,000 to $11,200. In fact, the Doble had a better fuel-consumption record than did the Stanley or the White steam automobile.

The starting time for the Doble was much faster than its competitors. Standing outdoors in the dead of a Minneapolis winter, a Doble would start and move away in 22 seconds—the others took five to ten minutes.

Near the Doble factory in Emeryville, California, is a hill which was favored by test drivers. It was steep and roughly two miles in length. Gasoline-driven cars had to rush it flat out and even then might not make it. A Doble could start at the bottom at a standstill and zip to the top.

If Abner hadn't been so extravagant as far as the construction of the automobile was concerned, meaning unnecessary materials, such as nickel-plated bumpers, he might have made out well in the automotive industry.

Paul F. Doble
Hanover, Massachusetts

Generally, steam engines consume twice the fuel of internal combustion engines. A Doble's water supply would freeze in winter despite its "flash" boiler. Ed.

Dear Sir: During the 1930s I owned a 1926 Stanley Steamer, the last model built. With full boiler pressure, it would accelerate to 65 miles an hour, but in steady running would do only 55.

I also drove a Doble with a view to buying it. It was a smooth, pleasant car, with fairly low fuel consumption, but was much too complicated for operation and maintenance by anyone but an engineer.

I like steam and wish there were steam cars again. But an article should not ignore the very real problems.

Herbert L. Nichols
Greenwich, Connecticut

Dear Sir: Actually, there are a couple of very sound engineering reasons why the efficiency of the steam turbine drops alarmingly as it is scaled down to automotive sizes. Mr. Lear is, to the best of my knowledge, the first to try this dubious

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your friend Karen
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All I know is that
sometimes I catch
a glimpse of those
laugh lines of yours and
they do more for me
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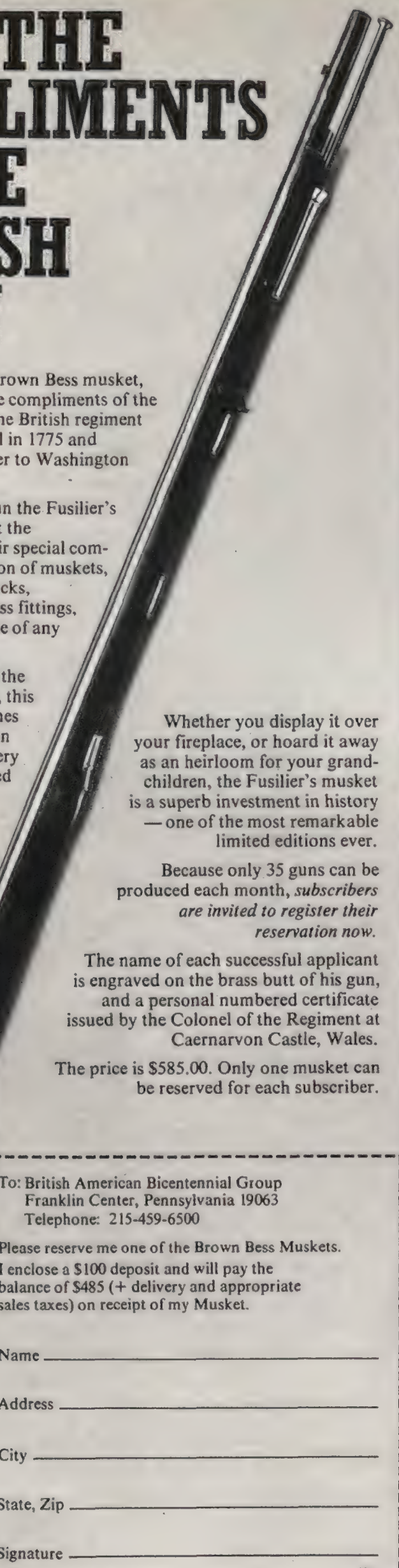
WITH THE COMPLIMENTS OF THE BRITISH ARMY



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approach since Father Verbiest built his turbine-powered steam carriage model for the edification of the Chinese Imperial family back in the 17th century.

Journalistic reaction to today's steam car researchers might best be expressed in the words of one of the gentlemen who started it all—James Watt: "The velocity, violence, magnitude and horrible noise of the engine give unusual satisfaction to all beholders . . . and, by the by, the noise seems to convey great ideas of its power to the ignorant, who seem to be no more taken with modest merit in an engine than in a man."
H. D. Garner
Newport News, Virginia

Borobudur temple

Dear Sir: Strangely enough, the article on Java's Borobudur temple contains a show business inaccuracy. Chulalongkorn was indeed a king of Siam and he did visit Java, but the ruler immortalized by Yul Brynner in *The King and I* was King Mongkut, Chulalongkorn's father.
Michael Harrah
Producer, The American Stage Festival
Reno, Nevada
Mr. Harrah is correct. Ed.

Monticello

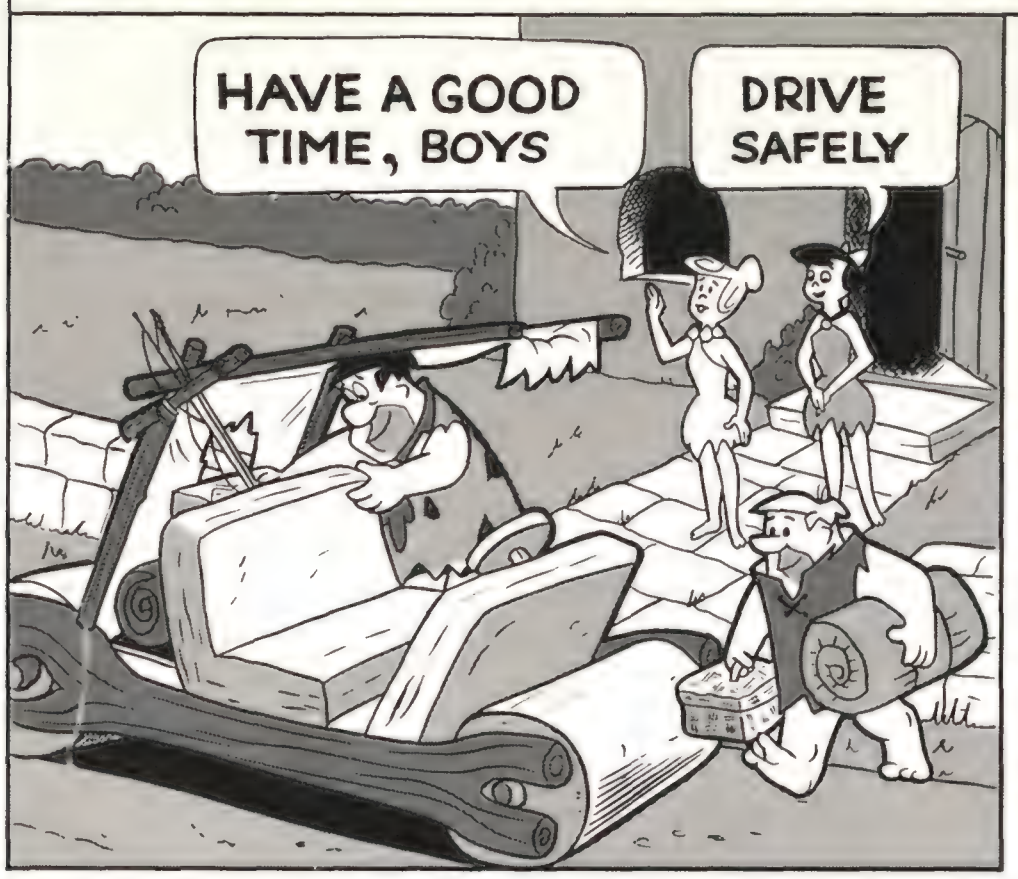
Dear Sir: The $2 bill shows the facade of Monticello with a lion on each side of the steps, but they do not appear in your photograph. What happened to them?
Geoffrey Stanford
Houston, Texas
The lions, removed in the Twenties, are probably in Nashville, Tennessee. Ed.

Paul Revere

Dear Sir: I feel sorry for the narrow-minded letter writers who were offended by being told the true story of Paul Revere's ride.

As the Captain-Commanding of the Northbridge Provincial Militia (a re-created group of men, "playing the part" of Colonial militia men in battle reenactments), I often lecture to school groups about the people of the Revolution. When I bring up such facts as those in Richard O'Donnell's article, I get a most favorable response from the students.
Captain Arthur L. Rainville
Whitinsville, Massachusetts

FRED and BARNEY drive the INTERSTATES



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EATON Truck Components

By Edward Edelson

Gaudy new way to see things you cannot see

Hidden details in black-and-white pictures leap out in eerily brilliant color to help guide scalpels, telescopes, even buzz saws

If you want information about almost anything on earth, technologists have a quick suggestion: Take a picture. You can take that picture in many different ways. You can keep your feet planted firmly on the ground, or go up in an aircraft or, if the object is big enough, go up even further in a spacecraft. You can stick to visible light, either black and white or glorious color; you can use x rays to see what is going on inside something or someone; you can use infrared detectors to pick up the variations in heat radiation by objects; you can even—if you want to test, say, a critical spacecraft part—shoot neutrons through it to detect possible cracks or flaws.

But whatever kind of picture you take, maybe it isn't good enough for your purposes. Maybe you need specialized information that the picture will not yield to inspection by the naked eye, no matter how skilled the brain behind that eye. Then technologists have another suggestion: Try a technique that goes by a typically technological, uneuphonious yet precisely descriptive name—density slicing and color coding.

The principle is simple. Put your picture under a television scanning camera. The scanner examines each tiny portion of the picture and determines its photogenic density, dark or light. (That's the density slicing part.) Then the electrical signal from the scanner is fed through an analyzer that converts each given slice of photographic density to a color—magenta for one shade, red for another, green for another—up to 64 different colors, if you want. Now you have a picture in which contrasts stand out boldly and unmistakably, not like the various shades in the gray scale that you had on the original. The new picture is dazzlingly unlike anything in real life—but it is also an image that can give you a better picture of what is happening in real life.

For example, take the case of the Santa Barbara oil slick. When the seabed off the California coast cracked open early in 1969 and petroleum spewed out, a heated controversy erupted between environmentalists and oil company officials about the extent of the spill, with estimates of flow rates ranging from hundreds of gallons a day (at one extreme) to hundreds of thousands of gallons at the other.

Aerial photographs could not settle the issue. In black and white, the contrast between oil and water was not great, particularly when one was trying to distinguish between a smooth oil slick and a calm area of clean water. Even on color photographs both seawater and oil came out in close shades of gray-green. In this case, to the naked eye, oil and water mixed.

But the TV camera and its electronic circuitry neat-

Details blur in typical angiogram, an x-ray image of brain's blood supply after dye has been injected.

ly sliced the photographic densities and color coded them so that any untrained eye could tell which was oil and which was water. The oil came out green, clean water came out blue, and areas of lesser pollution showed up as reds and yellows. What is more, the machine that did the work had another highly useful feature: At the push of a button it would tell you what percentage of the picture was covered by any given color. Using the device, photo analysts first determined the size of the oil slick and then, estimating its thickness, could tell with reasonable certainty how much oil was escaping (an amount that turned out to be close to the higher estimates).

For those who are worried about machines making humans obsolete, there is a word of comfort. This machine is actually much more limited than the human eye, which can distinguish between thousands of different shades compared with only 64 for the machine. But the circuitry does fill a gap in human capability.

"What the eye can't do," says David Rutland, president of Spatial Data Systems, Inc., one manufacturer of these machines, "is isolate all the areas in a picture that have exactly the same shade of gray. The eye doesn't have a built-in absolute scale for comparison. You know how hard it is to match two colors exactly without having them side by side. The machine allows you to do this, and do it quantitatively."

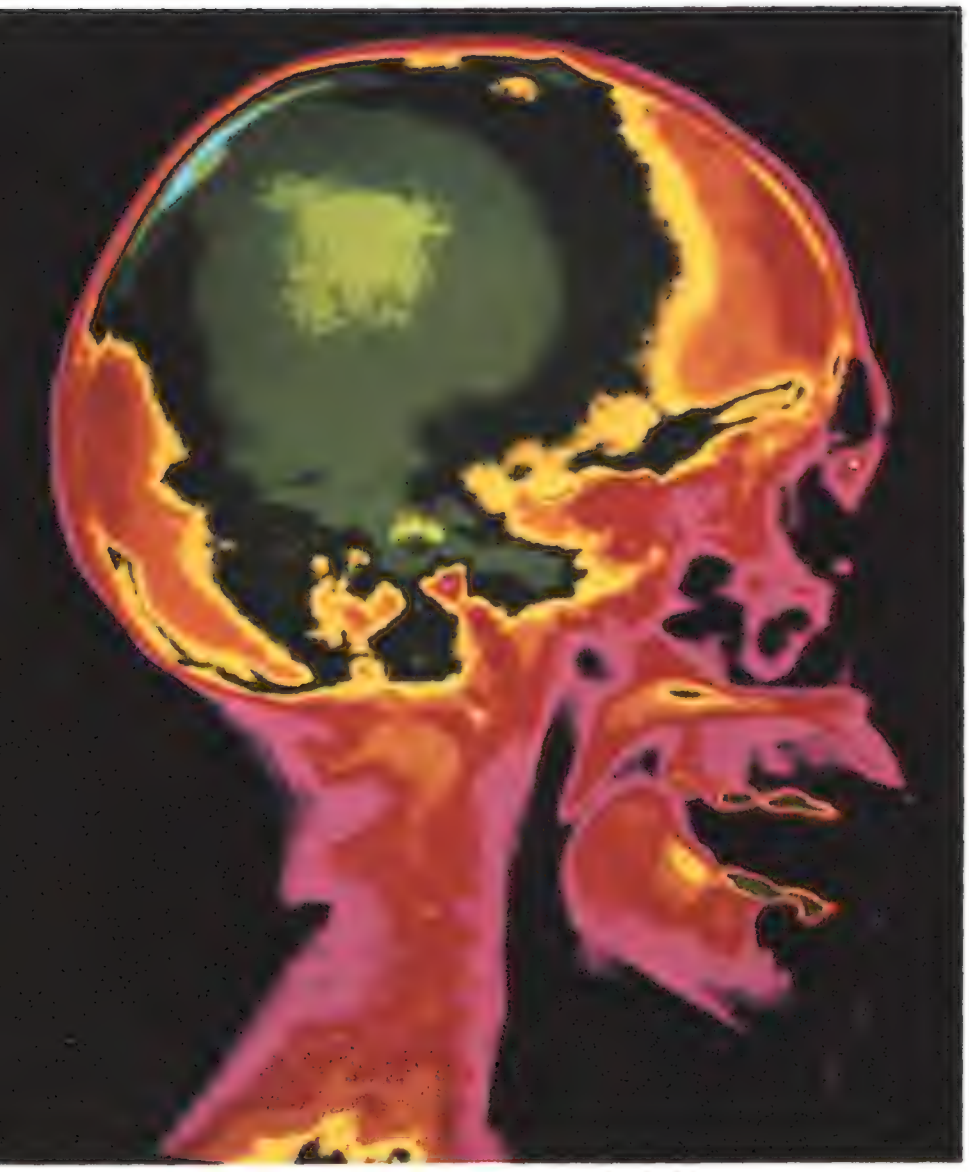
The ability to make such precise measurements—to slice densities and color code them—is finding applications in all sorts of fields, from the remote sensing that is literally giving us a new view of this planet and its resources, to a number of industrial testing methods, scientific research and even medicine.

Suppose, for example, that you're a neurosurgeon faced with the job of analyzing an angiogram, an x ray made by injecting radio-opaque dye into the blood vessels of the head. The result is a familiar gray-and-white x-ray plate (opposite page) that may or may not have the information you're after. Put that x-ray plate through the color-coding process and you have a color picture where formerly muddy areas now have clearly defined boundaries (below). You can keep the number of colors low to bring out some features, or increase the density slicing to the maximum in order to get a more detailed view. Anytime you are going into the brain, the more data you have, the better.

In another medical application, Dr. Gilbert Baum of the Albert Einstein College of Medicine in New York is wedding the color-coding technique to an equally advanced but unrelated diagnostic method, ultrasound scanning.

Baum, director of the ultrasound laboratory at Einstein, has been devoting effort for the last 17 years to diagnosis of tumors—and suspected tumors—of the eye. Anything that looks like a growth in an eye, explains Baum, presents an agonizing decision to doctor and patient. The method that works with suspected malignancies in almost every other part of the body—taking a biopsy, a sample of material from the growth—can't be done because it means losing the eye. Baum has been beaming in unhearable sound, at a frequency of 15 million cycles per second, and recording the echoes to get what he calls an "ultrasound snapshot." The next step in many cases is density slicing and color coding of the snapshot.

"Some people can have a mass caused by a hemorrhage in the eye, and the question is: Is it a tumor?" he says. "With conventional methods, it is very difficult to tell—some people have had eyes removed because a hemorrhage was mistaken for a tumor. Using ultrasound, we can show specifically whether it is a hemorrhage or a tumor."



Viewed by electronic device called a density slicer and color coded, an angiogram's details emerge.

Mr. Edelson is science editor for the New York Daily News. *Howard Sochurek, who photographed the Khrushchev-Nixon "kitchen debate," returned recently from another visit to the USSR.*

Photographs by Howard Sochurek

Baum is also involved in a less advanced project, an effort to determine whether ultrasound and color coding can detect breast cancer in its earliest—and hopefully most curable—stages. "We hope that we can come up with color patterns so standardized that doctors would know what any change in color or outline would represent—just the way a doctor reads a slide under the microscope." That effort is funded by the Breast Cancer Task Force of the National Cancer Institute, and Baum adds that it probably will not produce results for another two or three years.

The list of possible medical applications of color coding is growing. Any field where small differences in density make a big difference is a candidate. For example, take the neurosurgeon who is trying to destroy a pituitary tumor by cryogenics, the injection of supercold material at the end of a fine probe. An ordinary x ray gives equivocal information on the extent of the destruction; by color coding, the neurosurgeon can see the precise dimensions of the affected area, and so can avoid killing healthy brain cells. Or take the physician who had injected a radioactive iodine tracer in a thyroid test. Color coding will show with precision which parts of the thyroid gland have taken up the tracer, enabling a better and quicker diagnosis.

The technique that allows this more precise look into the human body also allows more informative looks into machines and their vital parts. The most important part of a nuclear generating plant is its core, which contains 100 tons or more of enriched uranium in the form of tiny pellets stacked into thousands of thin, 12-foot-long rods. Possible swelling or other distortion of these fuel rods under the enormous pressures, temperatures and radiation levels in the core is of obvious importance to nuclear engineers.

At the Lewis Research Center in Cleveland, Alex Vary and Kenneth J. Bowles have been testing fuel rods by using neutron radiography—shooting neutrons through the rods and making an image similar to those obtained with x rays. Analysis of these radiographs can be difficult, because the image often lacks sharpness, so the two researchers have added density slicing, displaying the results on a video screen.

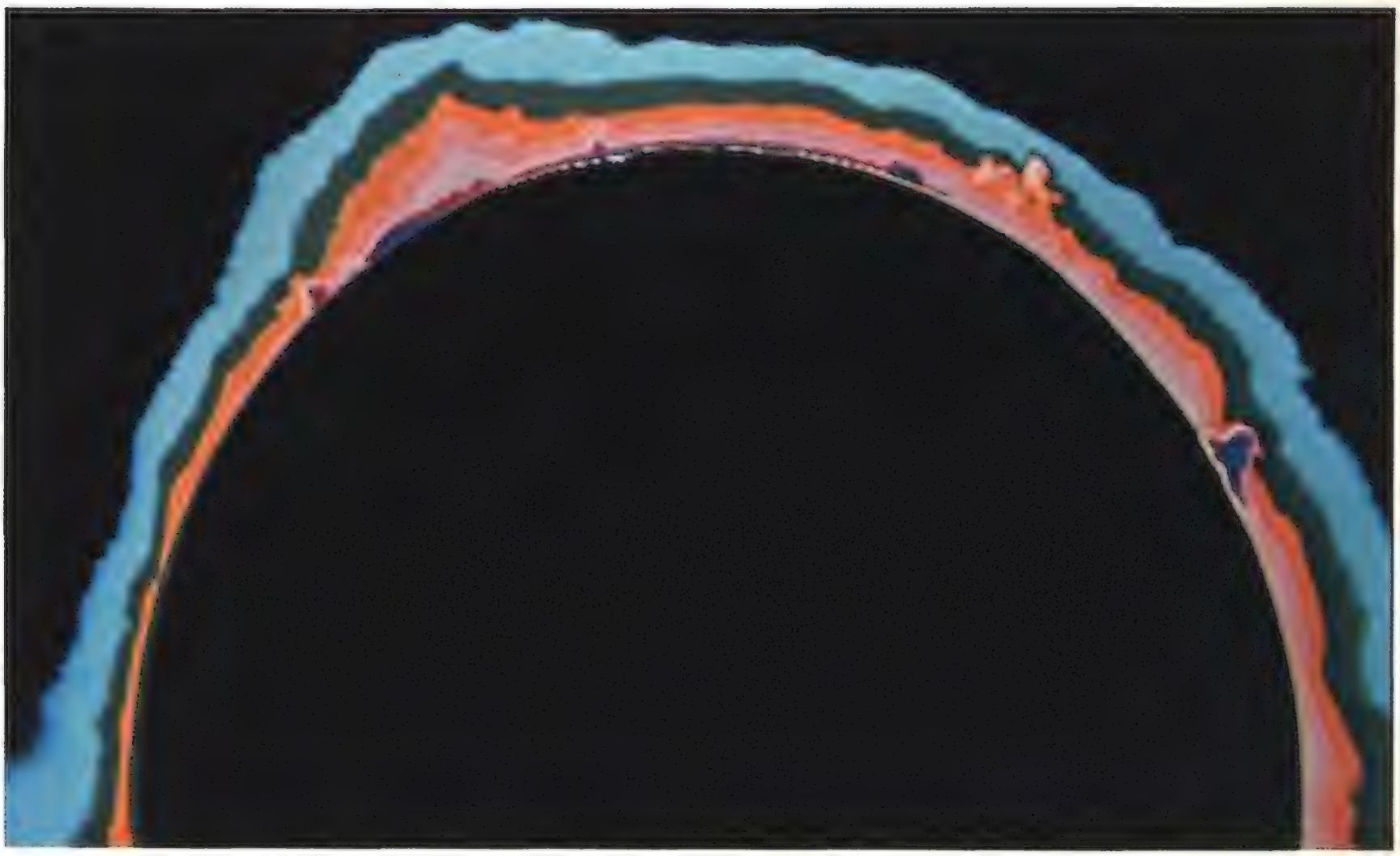
"Perhaps the most important conclusion to be drawn from this investigation," they report, "is that video-electronic image analysis not only affords reliable and accurate measurements from radiographs, but that it substantially reduces the time and effort to make these measurements."

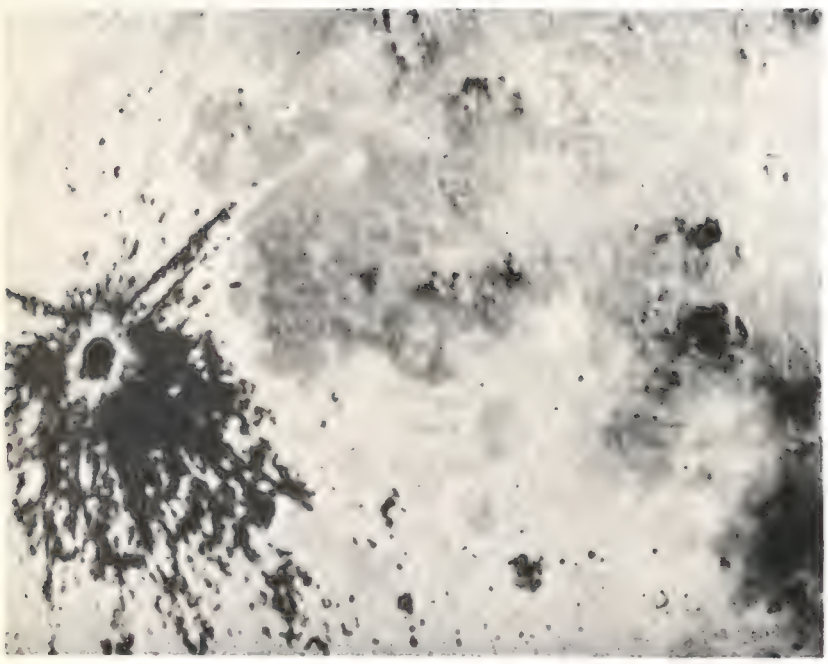
Density slicing and color coding can be a great help outside the laboratory. Say you are an agricultural agent trying to determine the extent of damage caused by a plant disease in a given farm area. You could go out, look at the plants one at a time, field by field, and then make your estimate. Or you could have an aircraft make an overflight with an infrared scanner, which detects the small but significant differences in the temperatures of healthy and sick plants. Then you run the infrared image through the color-coding process, which gives you an exact reading.

Suppose a forester is trying to determine how much damage an insect infestation has done to a stand of trees. Many insects plug or sever the channels through which water flows in trees, and the result is a higher temperature in the affected trees' leaves—the trees literally run a fever of two to five degrees centigrade. If he gets an image in the early afternoon, when the loss of water from the leaves is the highest, he can get a precise reading on which trees are sick and which

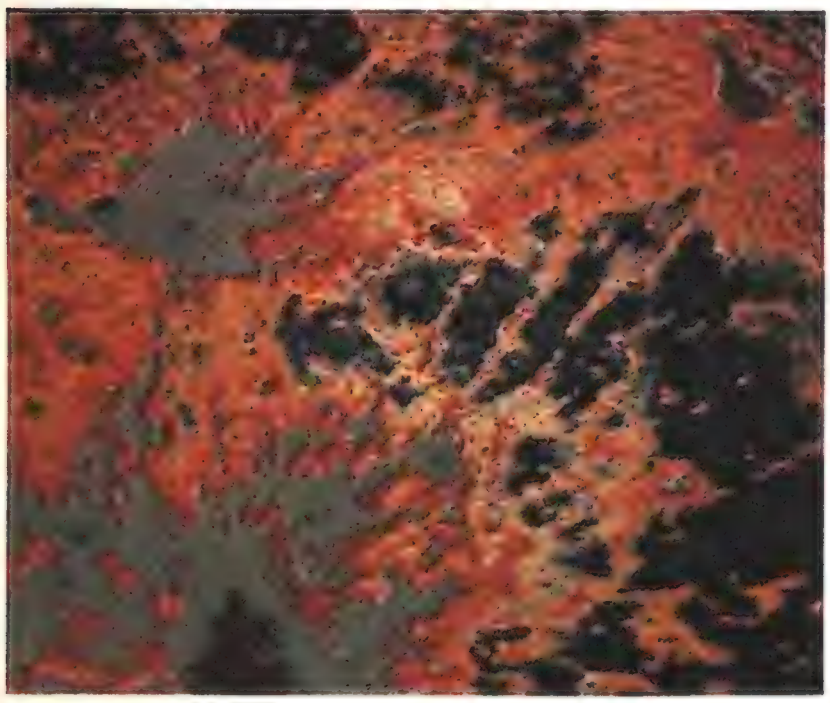
Solar flares erupt (above) showing white against thin solar corona. By treating only the light areas of the photograph and color coding them (right), one sees layers that might correspond to layers of gas.

Experiment in graphics: the photographer tinkered with color coding of a high speed x ray of pistol.





Density-slicing technique arose when space scientists began applying it to black-and-white photographs of lunar surface. Color coded as demonstrated below, such pictures yielded data on surface elevations.



ones are healthy—a sort of aerial house call on a forest.

Or say you're an environmental official trying to follow a drifting, shifting mass of polluted air, either to trace it back to its source or to find out where it's heading. Shoot when the sun is low in the sky and use a blue filter to get the maximum contrast between light transmittance through clean air and dirty air, then run the picture through the color coder to get exact boundaries of the smoggy area.

Or say you're an oceanographer trying to determine how much sediment is spilling from the mouth of a river. Aerial photographs in a specific sliver of the visible spectrum—blue, for instance—can pick up things that are happening below the surface of the water. You can tell, after color coding, the exact depth of the water and can even pick up the concentration and flow patterns of the river-borne sediment.

The National Hurricane Center in Miami is using color coding to determine the temperatures of clouds within a hurricane; there is a crucial difference between the behavior of a cold cloud and one that is relatively warm. The U.S. Geological Survey and the Iowa State Geological Survey are using the technique to search for mineral deposits and geological fault lines. And density slicing and color coding are an obvious means of analysis for the thousands of pictures being sent back by the Earth Resources Technology Satellite, which is giving mankind the most complete view yet of Earth (See SMITHSONIAN, January 1971).

The uses are practically endless: to detect water leakage around a dam (wet soil has a different color density from dry soil); to follow in detail the heated water that spills out of an electric generating plant or factory; to make precise maps of land use in order to help draw up plans for organizing growth in cities and suburbs.

The technique can be used for intensely practical, even mundane purposes. Calspan (formerly the Cornell Aeronautical Laboratory) in Buffalo, New York, used density slicing and color coding to determine which parts of an airport runway needed repaving: The color-coded picture showed clearly where the runways were getting the heaviest use. Or it can be used in pure, basic science—for instance, to select precise details on the surface of the moon (as at left), or to make a more skilled analysis of the inner details of the corona, the halo of tenuous heated gas that surrounds the sun (pp. 24-25). And since astronomers have started using the technique to study the radiation emitted by stars and galaxies, the universe is, literally, the limit.

Surreal portrait arises from superimposing patient's profile over color-coded angiogram of his brain.

By Peter Blake

In architecture, Marcel Breuer cooks the best goulash

The Hungarian-born architect has designed many 20th-century classics—from the tubular steel chair to the Whitney Museum

With an Alexander Calder mobile behind him, Marcel Breuer sits near the house he designed for

Any time I play a disastrous (for me) game of chess with Lajko in his summer cottage up in Wellfleet on Cape Cod, or listen to one of his raucous, Hungarian-English jokes in his home in New Canaan, Connecticut, or in his New York office, I find it difficult to realize that I am in the presence of a Great Man. Yet Lajko—known to the world as Marcel Lajos Breuer—is, quite obviously, one of the greatest of those few men who shaped modern architecture and modern design after World War I. Having been the youngest among those innovators, he is now the last living major pioneer of his generation.

The reason it is hard to think of Lajko as a Great Man is that he is probably one of the most unpretentious people I have ever known. He is much more likely to forget the name of a potential millionaire client than that of the local carpenter. He looks like a cheerful Benedictine abbot, which may be one reason the Benedictines have so often asked him to design monasteries for them. He has the jolliness of a Hungarian peasant entirely at peace with the world. I would guess that he has not a single enemy anywhere.

His former students at Harvard, a band that includes some of the best third-generation modernists practicing today—Edward L. Barnes, Ulrich Franzen, John Johansen, Harry Seidler, and many others—are so emotionally attached to him that about 80 of them rented a Greek restaurant last year, on Manhattan's Upper East Side, to throw a huge party for Lajko's 70th birthday. The festivities included vast amounts of food, drink, wild Greek music, impromptu speeches and an "Egyptian" belly dancer. A magnificent time was had by all, and especially by Lajko and Connie, his American-born wife. I cannot think of any teacher who has inspired such genuine and lasting affection.

None of his students ever called him anything but Lajko, and it is a private joke among his friends to have some luminary address him as "Marcel" (Lajko is a Hungarian nickname for Lajos, the equivalent of Louis). But his personal warmth is only one reason for the enormous affection he has generated among former students. Much more important is their recognition that he was, and is, a superlatively good teacher and a truly inspired designer.

Breuer has demonstrated both of these talents over a career that now spans more than 50 years. He was born in Pécs, Hungary, in 1902 and left it for Vienna at the age of 18 to study painting and sculpture. But he soon discovered that his real interest lay in architecture and furniture design, and so he decided to attend the newly founded Bauhaus school in Weimar, Germany. It was a very good time to enter that school. The architect Walter Gropius, who had been appointed to head the Bauhaus, had attracted some immense tal-

himself in 1951. The New Canaan, Connecticut, house has a flat roof and fieldstone exterior walls.

ents to the faculty—artists and designers like Paul Klee, Wassily Kandinsky, Josef Albers, Oskar Schlemmer, Herbert Bayer, Lyonel Feininger, and too many more to list. As a young student Breuer started concentrating almost entirely on the design of furniture—all of it very angular, very inventive, very "pure." Most importantly, he not only designed those now-famous wood-and-stretched-canvas chairs and those solid beds and tables, he learned how to *make* them. And so, after four years as a student, Breuer, at the ripe old age of 22, was made Master of the Bauhaus Carpentry Shop. It was recognition on the part of his considerably older peers that his was a very rare talent.

Lajko remained at the Bauhaus until 1928, designing prototypes for almost all the tubular steel furniture that we see around us today. The Bauhaus had moved to Dessau in 1926, into new buildings designed primarily by Gropius and furnished almost entirely with Breuer's new chairs and tables. But Breuer, meanwhile, had become increasingly preoccupied with architecture. So in 1928, at the age of 26, he decided to move to Berlin, where the action was, and to open his own architectural office. He remained there four years, designing exhibitions, interiors and large architectural projects for international competitions. Then, in 1932, he designed and built his first house, for a client in Wiesbaden.

Next came travels around the Mediterranean, and projects and buildings and more furniture in Switzerland and France. (With the advent of Hitler in 1933, Breuer, like most of his fellow artists, regretfully left Germany.) During those years he collaborated on the small Dolderthal apartment blocks near Zurich for the great historian of the modern movement, Siegfried Giedion. These apartment blocks were not only masterful (and highly original) in terms of planning and design; they were also so well built that even today, 40 years later, they show very little wear and tear.

Next stop, London—and a brief and happy partnership with F. R. S. Yorke, and more beautiful furniture and projects and a handful of buildings—including one of native stone and glass, a departure from the machine-art ideology of its time that distinctly sepa-

Mr. Blake has known Marcel Breuer since the late 1940s, when he wrote the first monograph on Breuer. Today, Mr. Blake is a practicing architect and editor in chief of Architecture PLUS.

Breuer, then in his early twenties, sits in one of his own designs—a tubular steel chair.

rated Breuer from many of his more doctrinaire contemporaries. And finally, in 1937, Lajko moved to the United States to stay—first at Harvard, where Gropius was chairman of the department of architecture and had invited him to teach, then to practice in Cambridge, Massachusetts, and Manhattan—and ultimately around the world.

At first there were only houses, but *what* houses! Then, in 1953, came the opportunity to collaborate on the design for the UNESCO headquarters in Paris—a quantitative jump in scale that would have unhinged most other architects. And, after that, a steady stream of commissions, ranging from marvelous, terraced houses on Italy's Lake Maggiore (pp. 34-35) to monasteries and convents (p. 33) in Minnesota, North Dakota and Switzerland; from resorts in the French Alps (opposite) to buildings for industry in Florida, Connecticut, on the French Riviera and in California; and from the Whitney Museum of American Art (p. 32) in Manhattan to vast, new facilities at Grand Coulee Dam near Spokane. (And, now and then, almost sneakily, a charming little house.)

It is entirely probable that somebody, sooner or later, would have invented furniture constructed of continuous tubes of chromium-plated steel; but the fact is that it was Breuer who did it first—in 1925. It is also probable that somebody, sooner or later, would have designed bent and molded and laminated plywood chairs, or translated the American traditions of wood-and-stone building into an entirely modern idiom, or made modular, precast concrete into a building unit as flexible as brick. But the fact is that Breuer was really the first one to do it, and that his prototypes have often been copied but rarely improved upon over the decades. It is also entirely probable that somebody, sooner or later, would have figured out a way of teaching young men and women to become first-rate mod-

Known for his rugged, forceful-looking buildings, Breuer is surprisingly mild and gentle in person.

With its imposing concrete terrace cantilevered over a rocky precipice, this four-star hotel is one of the most dramatic components of Flaine, an Alpine resort town that Breuer designed in its entirety.

The loftlike, fourth-floor gallery of the Whitney Museum has the most flexible exhibition space in Manhattan. The concrete ceiling grid allows for plug-in lighting and rearrangeable wall panels.

ern architects—that is, humanists in a technological society; but the fact is that Breuer, in the 1930s and early 1940s, did it first—in a very personal way, involving himself intimately with every student who was willing to listen and talk and draw.

Nothing that Lajko has ever designed has gone out of fashion. His furniture of the 1920s is more stylish now than it was then; his crisp houses of those years and of the 1930s are being emulated today all over the world; his later houses in Massachusetts and Connecticut, done in the 1940s and early 1950s, make most of today's modern houses look a little insipid and his poured-concrete structures for all those monks and nuns make most of his imitators seem timid.

If one tried to analyze in any rational way how Breuer came to these innovations in steel and glass and concrete and stone, one might be stumped. He is an entirely instinctive genius, taking as much delight in the way bread is baked in some primitive farm oven as in the way concrete is prestressed in a computerized factory. He invented chromium-plated tubular steel furniture not because he was consciously looking for a new furniture technology but because he had acquired a beautiful bicycle and began to admire its elegant handlebars, which led him to other thoughts.

"Instinctive" is probably the correct word. In fact, I think he has sometimes failed, in recent years, to produce a really first-rate building when he has tried to be a little too rational. His best buildings and his best chairs are only semirational. (Who, in his right mind, would propose that the ultimate modern chair might be a compressed-air jet emanating from the floor of a house? Breuer thought it might be—in 1926.)

His best buildings are really some sort of architectural goulash consisting of intelligence, taste, art, technology and approximately 100 parts of humanity. Once, many years ago, Breuer wrote a poem that speaks, in part, of "the taste of space on your tongue . . . the juice of stone." In short, goulash. He is simply the very best cook the modern movement has ever known, because he knows his ingredients better than anybody else.

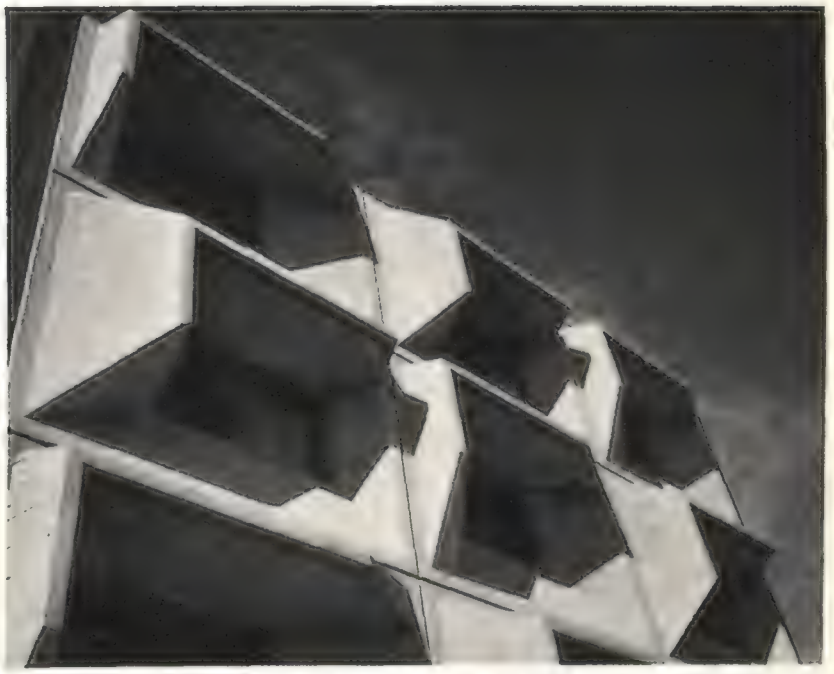
"For example," Breuer wrote, back in 1955, "an exterior wall in a building will necessarily have another kind of wall surface than an interior partition. They are two different kinds of slabs. . . . Each of these slabs is a tool for living: The outside wall is a tool to keep out heat or cold. . . . A partition is a tool for partition-

Skylights illuminate a ribbed, concrete wall of St. Francis de Sales Church in Muskegon, Michigan.

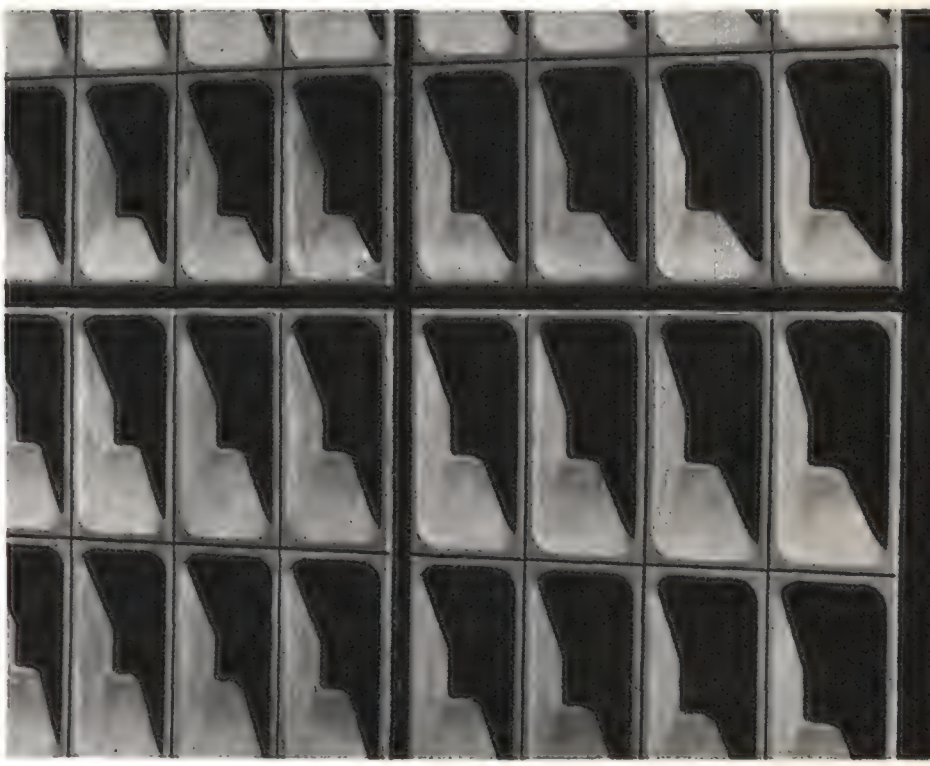
ing something off from something else. . . . Because we recognize the difference in function in these architectural tools. . . we do not use a kind of sauce—a color-sauce or a materials-sauce or a wallpaper-sauce—to cover everything with the same applied surface."

I never worked in Lajko's office, but I know a great many young men and women who have. They are very fond of him—even those who quit—but some of them became infuriated because nothing, absolutely nothing, would ever be allowed to come out of that office without first having been checked out and often redesigned by Breuer himself. He is completely obsessive about the detailing of his buildings: There is probably no sliding window, no gravel-stop along the edge of a flat roof, no stair rail in a summer cottage that Breuer has not worried about and perfected through sleepless nights.

I remember listening to him, once, about the way one had to design and build a flat-roof gravel-stop: It had to project an inch or so beyond the face of the wall below, so that rainwater would not streak the wall; it had to be reinforced with a steel angle, because the roof line would be silhouetted against the sky and, hence, it would be the most visible edge of



Breuer is noted for his imaginative treatment of windows. Above: St. John's University in Minnesota.



The Cleveland Trust skyscraper has concave window panels, with recessed glazing, of granite aggregate.

Concrete sunshades are angled inward to suggest cloistering in Baldegg Convent chapel near Lucerne.

your building and so it had to be dead straight; it had to be covered with lead-coated copper, because anything else would rust and stain; it had to be wedged up to form a curb around the roof, because otherwise you would *still* have water dripping over the edge; it had to have expansion joints that would not show; and if you were going to have scuppers that would spout water off the roof you would have to worry about what happened to rainwater once it hit the ground in a steady stream—and so you would want to arrange for gravel-filled receptacles that would drain off the steady drip. And then Lajko would go on from there to talk about what kinds of plants could survive the steady drip of rainwater, and so on and so forth.

Once, when he was watching a rough fieldstone wall go up in Connecticut—watching a most conscientious Italian mason match the stones and lay them up as neatly as he knew how—Lajko decided that he had to show this conscientious man exactly what he had in mind: a kind of artful, random rubble wall not at all tidy but not exactly untidy. On other occasions, when he wanted flagstone-floored rooms or terraces, he drew up, in meticulous detail, how those flagstones should be cut and fitted together. I suspect he knows more about that kind of thing than any mason on the Eastern Seaboard.

But Lajko, while deadly serious about the quality of his work, doesn't take himself nearly so seriously. In fact, he rather enjoys poking fun at his own foibles: In his architectural office, in a rather banal, commercial office building in midtown Manhattan, the walls of the entrance lobby are papered with photographs of "Breuer" stone walls, and the floors are covered with imitation "Breuer" flagstone made of vinyl. Well, any card-carrying purist turns pale at the sight of such profanity; Lajko obviously enjoyed twitting one of Manhattan's cornball buildings.

In some ways the Whitney Museum is a wonderful case of what Breuer is all about. This granite-faced, upside-down ziggurat makes all other Manhattan museums look a little feeble; even Frank Lloyd Wright's Guggenheim, let's face it, looks like a marshmallow by comparison. The Whitney is tough: Made of granite and concrete, it is so damned well thought through in every single detail—the ceiling grid, the lighting, the flexible exhibition spaces, the carving out of precious outdoor space, in sunken courts, on an impossibly small (100 by 125 feet) corner site. It is just a truly virtuoso performance, regardless of whether or not you like those trapezoidal goo-goo eyes that pop out through the granite walls.

Lajko doesn't ever talk about his buildings. He sometimes—not very often—talks about the things he is working on, and he will say something like: "You know, we found this wonderful stone nearby" or "the contractor who made the forms for the concrete was really like a cabinetmaker" or "this client—he really understood everything." In trying to recollect, I found that I never heard Lajko really talk about himself.

And that, I think, is why all of us love him. He speaks to us through his buildings. And those of us who have been touched by his warmth, his talent, and his crazy humor, have found our lives enriched.

It is interesting that he likes to play chess, a game in which it is impossible to cheat; for Lajko does not cheat at life, or at art.

The Koerfer House, completed in 1967, is one of Breuer's most striking works. Entrance hall (above) features materials with contrasting textures.

The exterior of the Koerfer House is comprised of rectilinear elements of concrete, masonry and glass. A roof terrace (opposite) overlooks Lake Maggiore.

Roman holidays, like the American, were exuberant, exhausting, expensive

Rome's social set built palatial estates along the shore for vacations away from city's heat.

Villa owners spent a good part of their time making leisurely visits to each other.

If you've had *vacation traffic, flimsy motels, crowded resorts, insipid food and rotten kids, take heart: It was bad in Nero's day, too*

By Lionel Casson

Drawings by James Flora

"I intend," wrote Cicero to a friend in 59 B.C., "to get to my place at Formiae [present-day Formia] on the Feast of Pales [April 21] . . . I'll leave Formiae on the first day of May so as to reach Antium [Anzio] on the third. There are gladiators at Antium from the fourth to the sixth, and Tullia [Cicero's daughter] wants to see them. Then I'm thinking of going to Tusculum, and from there to Arpinum, reaching Rome on the first of June." All over Rome letters like this went back and forth when spring arrived—the signal for the fashionable world to leave the city and start making the rounds of their various country villas.

The posh resort hotel, offering a vacation safely sealed off from the masses, was unknown in ancient times. Rome's social set built palatial estates—along the shore for the cool and pleasant days of spring, in the mountains for the summertime when the Mediterranean sun made the shore an inferno, and several of each to avoid the monotony of always going to the same place.

They took rides along the coast in litters, or excursions around the bay in oar-propelled yachts.

The favored spot for seaside establishments was the stunningly beautiful shoreline embraced by the arms of the Bay of Naples, from Cape Miseno on the west, past Naples and Vesuvius to the Sorrento peninsula on the east, with Capri poised between. By the first century B.C., so many of the wealthy had put up villas there that real estate values skyrocketed. Terraces and piers thrust far into the water, and Horace, the genial Roman satirist, was moved to observe that the fish were feeling cramped. Cicero had no less than three villas in the area, to say nothing of the one at Formiae mentioned in his letter.

Sometime before 60 B.C., Cicero bought his first place on the bay itself, but it was not quite within the charmed circle where the people who counted had their villas. A few years later he got a second, and this time hit the bull's-eye. A small-town boy who had made it in the big city, Cicero was now next door to the high and mighty who had so annoying a way of looking down their Roman noses at a *novus homo,* a "new man," an upstart whose place in politics and society came from ability and not pedigree.

In 45 B.C., just before Cicero's death, a friend willed him still another villa near Puteoli (now Pozzuoli). This town served as port and commercial center, as well as seaside resort, and Cicero found it convenient when he wanted to transact business, as well as to relax. Two of the places he names in his letter, Tusculum (near Frascati) and Arpinum, were hillside retreats near Rome. On top of all these establishments, he maintained lodges along the road so he could be sure of having a proper place to put up overnight when going from one to the other.

Professor Lionel Casson, a noted classicist at New York University, wrote about ancient tourism in SMITHSONIAN, *September 1971.*

Cicero was, no question about it, a man of property. Yet by the standards of the day he was only moderately wealthy. Those exalted neighbors of his along the Bay of Naples included Julius Caesar, Mark Antony and that celebrated bon vivant, Lucullus, and their establishments put Cicero's to shame. Augustus' stepfather owned one where he once accommodated not only Caesar, but Caesar's retinue of 2,000. Most stupendous of all was the villa Lucullus built at Naples (he had another, somewhat less sumptuous, only 12 miles southwest). It had, among other things, a tunnel driven through the nearby mountains just to bring in seawater to fill his fishponds. "Xerxes in a toga," was the way one acidulous visitor, after being shown the place, described his host. He referred, of course, to the glittering ruler of Persia who, in his prodigality, built a bridge of boats across the Hellespont and hacked a canal through the Isthmus of Athos to speed his invasion of Periclean Greece.

When, a few decades before the birth of Christ, republican Rome became imperial Rome, emperors and their relatives took over the villas from Cicero and his fellow landowners. Augustus, founder of the empire, maintained at least four in the area. His successor, Tiberius, spent most of the last ten years of his life at a monumental establishment on Capri. Nero was staying at his villa at Baiae on the western arm of the Bay of Naples the night he attempted to drown his mother.

Only the *very* rich were members of "the fishpond set."

Seneca sought "quiet lodgings" above public baths.

He finally had her assassinated in the bedroom of her own place a few miles away.

For neighbors these rulers had a new class of villa owner brought into being by the booming prosperity of the early empire. Vedius Pollio, son of ex-slaves, went from rags to riches and built himself a villa on a height between Naples and Puteoli. It was the likes of Pollio who provided the model for Petronius' character Trimalchio, the ex-slave who became a multimillionaire. The novelist sets the scene of Trimalchio's gargantuan dinner party in the *Satyricon* at a deluxe villa near Naples.

Some Romans liked a villa right at the edge of the shore, others one that nestled high on a seaside cliff. In either case, what determined location and layout was a view of the water. Rooms were not very large and windows were usually small to keep the brilliant sunlight from flooding in. Walls were painted with elaborate and fanciful decor—scenes from mythology, genre scenes, landscapes, seascapes. Outside stood prim rows of plane trees, myrtle, boxwood, and the like.

The distinctive mark of really lavish villas, like Lucullus', were the *piscinae,* or fishponds, where special breeds were raised for the master's table. This was *the* status symbol; only the very, very, *very* rich were *piscinarii,* to use Cicero's word for them, members of "the fishpond set." Rumors went around that that Johnny-come-lately Vedius Pollio fed his *muraenae (*a type of eel prized by Roman gourmets) on human flesh.

Villa owners spent a good part of their time making leisurely visits to each other, usually capped by elaborate dinner parties. Other diversions included rides along the shore in litters, or excursions on nearby lakes or around the bay in oar-propelled yachts. "When [the fashionable crowd] goes sailing in their gaily painted yachts," observed one historian tartly, "it's a veritable quest for the Golden Fleece, particularly when they venture forth in steaming hot weather. If a fly slips in between the silk-fringed gilded fans, or a tiny ray of sun comes through a hole in the canopies suspended over them, out come laments that they weren't born in the land of the Cimmerians [a legendary people who lived in fog and darkness]."

Of all the towns along the Bay of Naples, none was more celebrated than Baiae, ten miles or so west of Naples and still, as Baia, a place that tourists visit. This was Rome's first summer resort and forever remained the most popular. Being well supplied with hot springs, it became a favored watering spot as well. Baiae attracted pleasure-seekers of all kinds and, as

will happen, acquired a reputation for impure as well as pure delights. Respectable society sailed decorously about the lakes during the day; but at night the smart set invited shady women aboard their yachts, went bathing in the nude, and "filled the lakes with the din of their singing."

"Unmarried girls are common property, old men act like young boys, and lots of young boys like young girls," snapped Varro, Cicero's learned contemporary.

"Why must I look at drunks staggering along the shore or noisy boating parties?" complained the moralist Seneca a century later. Who wants to listen, he grumbled, "to the squabbles of nocturnal serenaders?"

Cicero in one of his speeches describes immorality in terms of "debauchery, love affairs, adultery and Baiae"—the name by itself spoke volumes. Later on he thunders about a loose woman's vicious habit of going to dinner parties with men who are total strangers to her not only in Rome, not only in the gardens of her own villa, but—most horrible of all—"amid those crowds at Baiae."

Martial, the satirist, composed a sardonic little poem about a certain couple:

The wife, even worse than her glowering husband,
never strayed from virtue's paths,
until she came to the Lucrine Lake
and heated up in Baiae's baths.
It put her on fire: she left him flat
to run off with some young boy;
she came to town Penelope,
she left it Helen of Troy.

The straitlaced Augustus, though he often vacationed in the neighborhood, never showed his face in Baiae and took a dim view of those who did. Equally straitlaced Seneca, with all his complaints about the area, couldn't resist its attractions. But he refused to keep a villa there and perhaps even rented lodgings—it must have been a matter of principle, since he was one of the wealthiest men in Rome. On this occasion he chose to install himself—heaven alone knows why—above some public baths, and his description of the noise makes a hotel room in the heart of today's city traffic seem like a haven of quiet.

"Imagine," he writes, "every kind of sound that can get a person to hate his ears. When the hardy types take their exercise and heft the barbells, when they work out—or make believe they're working out—I hear the grunting, and the wheezing at maximum pitch when they let out the breath they've been holding in. Whenever I notice someone too lazy to mind getting the poor man's massage, next thing I hear is the slap-crack of hand landing on shoulder. And as a referee takes his position and begins calling out scores, I'm done for. Add some argumentative type or thief getting taken into custody, and the fellow who loves to hear his voice in the bathtub. Also the ones who simply have to make a big splash when they dive into the pool.

"On top of all these, imagine the hair-removal expert forever forcing out that thin screech of his so everybody can hear him advertise his services and never shutting up—except when he's plucking somebody's armpits and getting the customer to yelp for

Restaurants were the place for *dolce far niente.*

him. And the hawkers of cakes, of sausages, of pastries. And the café managers touting their food each with his own special tone of voice."

No wonder those who could afford it had their own places well out of town.

The glittering villa folk were only the upper crust of the crowds on holiday around the Bay of Naples. Particularly during the prosperous first two centuries A.D., people of all walks of life were able to descend on Baiae or Puteoli or Naples in season and happily put up in the sort of lodgings Seneca describes in order to get out of the heat inland. Finding pleasant ways to pass their time was no problem. Not only Baiae, but the whole shore around the bay was studded with hot springs, so the vacationer was able to divide his days between baths and beach, or, if he wished, to rent a small boat and go out on the water.

Heat drove the *haut monde* from shore to cool hills.

Gladiator shows for the summer circuit

Puteoli had an amphitheater, so there must have been a good selection of gladiator shows for the sports enthusiasts. Then there were visits to be made to the fishponds in the emperor's villa, which were open to the public, visits to the oyster beds, strolls through Baiae's *silva,* or tree-shaded park, jaunts down to the pier at Puteoli to watch the ships come in, shore dinners in the local restaurants, shopping for gimcrack souvenirs—or just the unadorned joys of Mediterranean *dolce far niente.*

Like many of our summer resorts, those along the Bay of Naples had each its own personality. Baiae was spa and seaside playground combined, and the gathering spot of the pleasure-seekers. Puteoli was rather more staid, since its vacation area rubbed shoulders with one of Italy's most important commercial harbors; while people on holiday frolicked along the shore, merchants and shipowners bargained and stevedores sweated around the quays. Naples appealed to the intellectuals. In common with most of the great cities in southern Italy, it had been founded by the Greeks; and even in the days of the empire, after centuries of Roman domination, a Greek atmosphere reigned. Greek was heard up and down the streets, Greek ways of life lived on, and visiting Romans, infected by the atmosphere, doffed their togas to walk about in Greek cloaks.

The traditional Greek contests for poets and musicians were kept up and drew throngs of the culturally minded. It was in Naples, for example, that Nero made his debut as a musician and gave his first recital in public. This special atmosphere induced many cultivated people, foreigners as well as Romans, to take up permanent residence and promoted the growth of a thriving literary colony. Schoolmasters found Naples well suited for starting up schools, and the elderly for passing their declining days.

Year after year the Bay of Naples continued as a haven for vacationers. Romulus Augustulus, the last Roman emperor of the West, when exiled from the capital after A.D. 476, was sent to live out his time in one of Lucullus' villas, still in existence more than 500 years after its builder's death. Though the eruption of Vesuvius that destroyed Pompeii wiped out the estates on its flanks, and the convulsive crises that shook the empire through most of the third century A.D. thinned the ranks of the villas, life went on in much the same fashion; the gilded gentry continued to make their decorous rounds, or to have a wild time in Baiae. In A.D. 396, the Roman aristocrat Symmachus, who maintained no less than six villas in the area, wrote to one of his friends:

"I've passed a few days on this shore . . . where the healthy air and cool waters are such inducements to linger. . . . Now, through mutual invitations, we're transferring either to Bauli [Bacoli] or to Nicomachus' villa [Symmachus' son-in-law, near Puteoli]. I have a steady stream of friends dropping in on me. I'm not afraid that you'll think of me idling away my time in such delightful surroundings amid such good things. Wherever I am, I lead the life of a Roman consul; I'm serious even on Lake Lucrinus. No caroling in yachts, no gourmet banquets, no going to the baths, none of the young set's nude bathing parties."

Ordinary vacationers may have lingered on at the bathing resorts, but not the *haut monde.* With the onset of intense heat, they left their seaside villas with their staffs and transferred to the cool of the hills.

Those Roman holidays

The Alban and Sabine Hills that ring Rome on the east and southeast were high enough to offer protection from summer heat and near enough to the capital to enable a senator to leave the stifling senate chamber and refresh himself for a day or two with a minimum of travel. As a consequence, from the first century B.C. on, they were dotted with country retreats. In the neighborhood of Tusculum alone there were four belonging to various emperors and ten times that many owned by private citizens.

The greatest villa of the age, the villa to end all villas, was built on a ridge of varying levels below Tivoli, instead of on the cool slope. This grandiose complex, erected by the Emperor Hadrian, included two theaters, baths, libraries, endless porticoes, fountains—a veritable city with the room and facilities to accommodate thousands. The architecture was daring, avant-garde; the effect upon contemporaries must have been like that of world's fair architecture today. And the site was honeycombed with underground passageways so that the army of hard-working slaves who provided the services stayed discreetly out of view.

In the prosperous first two centuries of the Roman empire, not only the wealthy but the middle class had country refuges. Horace's farm in the Sabine Hills, where he rushed gratefully on every possible occasion, was no great villa but just a modest man's modest establishment. Martial, who started his career in a Roman garret three flights up, eventually got himself a little cottage surrounded by a few acres, some 13 miles as the crow flies from where Horace's farm had been located.

Though we call them "farms," they produced no crops; they were summer homes just as purely ornamental as the glamorous estates of the millionaires. Martial, for example, wrote a poem about a second-rate lawyer who made a poor but sure living off a clientele of rustics who used to pay him in produce. When he bought a piece of farm property to retire on, things were reversed:

So, Pannychus, you've bought some land,
with a ramshackle hut whose roof needs supports,
with a view on a roadside graveyard, and
you've deserted your city estate, the courts.

Your seedy gown paid steadily, if not well—
but the millet, barley, wheat and rye,
that when practicing law you used to sell,
now you're a farmer, you'll have to buy!

When the owners of such farms set out for a weekend in the country, they had to bring their own food with them. Martial describes one typical "gentleman farmer" you could see on the Appian Way in a cart groaning under a load of cabbages, leeks, lettuce, beets, fowl, hare and suckling pig:

Is he homeward bound from the country air?
It's the other way round—he's going there!

It's a station wagon or minibus today instead of a creaking cart, and a superhighway instead of the Via Appia, but otherwise things remain the same.

In laden cart or minibus, its off to the family "farm."

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For a copy of "The glass container story," write:
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A male damselfly, the common bluet *(Enallagma civile)* mates on a seed head with multicolored female.

Text and photographs by Paul D. Harwood

Nymph, damsel and dragon

In most places, late summer is the time to sit by a stream and watch the dragonflies exhibit their ancient airborne beauty

The sun sinks low and a man watches his horse switching its tail to scatter flies. Something that looks like a darning needle attacks the flies, its gossamer wings aflame in the slanting light. The pet is startled, as horses often are, and a myth is born—horse stinger! Horse stinger, snake doctor, snake feeder, mosquito hawk—these are among the epithets applied to the dragonfly, itself a fearful name.

"Can they sting?" people ask, and the answer is no.

"Are they dangerous in any way?" they ask, and the answer is yes, very, if you are a mosquito or of similar size, but they are completely harmless to humans. Thus reassured, the timid may well now yield to the temptation of seductive coloration and a graceful command of the air, and they can discover even more marvelous things as they spend a summer afternoon watching dragonflies dart about near a stream.

Comprising the natural order Odonata, dragonflies

Continued on p. 48

After mating, and with the males still clutching the females by the backs of their necks, damselflies congregate to deposit eggs in wet, mossy wood. Most are of the species *Argia moesta* (about four

times life size). One pair—at left, rear, which includes a light brown female—is *Argia apicalis*.

Continued from p. 45

are of obscure relationship with the other orders of insects. There are two basic kinds: the damselflies, called Zygoptera, in which the two pairs of wings are the same shape, and the true dragonflies (Anisoptera), in which the two pairs of wings differ in shape, the inner corners of the hind pair being expanded.

An immediately obvious distinction between the two kinds is that the true dragonflies are much larger. Thus they require more food and therefore are not so numerous as damselflies.

Yet another distinction can be seen in the photographs on these pages. The wings of most damselflies are held folded together and lie at rest along the ten segments of the abdomen, as seen in *Calopteryx* (translates as pretty wing) *maculata* (spotted). On the other hand, when a true dragonfly extends its wings laterally for its maiden flight, they stay extended for good. This can be seen in the male *Tanypteryx hageni,* a modern member of a primitive dragonfly family, the Petaluridae, which flourished in the Jurassic period 160 million years ago. (There is one family of American damselflies, called the Lestidae, which holds its wings partially open, a reason for thinking that the Lestidae are the closest of all the damselflies to a long extinct common ancestor of both kinds.)

In damselflies, the head is transverse, the prominent eyes separated by more than an eye's width; in dragonflies the head is compact, the eyes often in contact on

A member of a primitive group of true dragonflies, a male *Tanypteryx hageni* (shown about one-and-a-half times life size) rests inconspicuously on a mossy log. Note that wings are extended to side.

A female damselfly, *Calopteryx maculata,* is shown at twice actual size. The wings are folded along abdomen in attitude typical of damselflies. White wing spots may trigger the male mating impulse.

Shown about three times actual size, male damselfly *(Lestes rectangularis)* raises its segmented abdomen above level of its wings, a sign of annoyance. Females take this stance to repel unwanted suitors.

top of the head and never separated by an eye's width. During mating the male damselfly seizes its mate by the back of the neck (technically the protergum) while dragonflies seize the female by the top of the head.

Around streams or ponds one often finds damselflies with the wings and the tip of the abdomen slightly elevated, a signal that the insect is alarmed but not frightened into flying. When the abdomen is raised above the wings (as with *Lestes rectangularis* above), it is a clear sign of protest. Females also use this signal to send unwanted suitors on their way and the wise photographer freezes when he observes such reactions.

Life creates life, scientists create nothing. This humble spirit helps one observe the remarkable behavior of dragonflies during procreation. The sexually mature male seeks a suitable place near water and watches for a female. Other males may invade his territory during the vigil and mock battles take place with a swift flutter and flash of wings.

In male damselflies the openings of the sperm ducts are at the posterior border of the ninth segment, very close to the end of the abdomen. However, the copulatory organs are on the second segment so the male must bend his abdomen in full circle to charge the sperm reservoir in the second segment. Then the copulatory circle, which appropriately resembles the con-

ventional heart, is formed when the female curls her abdomen upward and forward to contact the male's second abdomen segment (see p. 45).

The males of most damselfly species accompany the females to the site where the eggs are to be deposited and the pairs often gather in concentrated groups, perhaps as a protective measure of some sort. An American genus, *Argia,* occasionally makes groups of mixed species (see pp. 46-47). I have noted that *Argia moesta,* which is common throughout North America, becomes especially numerous in streams that contain small amounts of raw sewage. In such places they may congregate in mats several feet across containing hundreds of pairs, perhaps as many as a thousand.

While the male supports the female wholly during copulation, the reverse is true during egg-laying or ovipositing, as it is called. In deep, clear water, the female may back downward until she is completely submerged. The male dragonfly stays with its mate until his wings reach the water's surface, at which point he usually frees himself. Occasionally a male damselfly may submerge with the female.

Damselflies place their eggs in plant tissues—usually under water (*Lestes* uses plant tissue above water)—but some of the true dragonflies are less fastidious, simply washing their eggs off the tip of the abdomen.

The development from egg to adult may be as brief as six weeks and as long as six years, depending on the species. The nymphs are completely predacious, eating other insects, some tadpoles and small fish, as well as each other. Damselfly nymphs are long and cylindrical. They swim with a wriggling motion and "breathe" dissolved oxygen through the body wall as well as through gills attached to the rear end of the body. The nymphs of true dragonflies are basically similar but they are stout-bodied and seem jet-propelled. The gills are in the rectal chamber and the nymph commonly swims by driving water forcibly out of the rectal chamber to the rear.

Yet another technique is used by the true dragonfly nymph. It has a large lower lip, or labium, that is used to seize prey. The lip folds up between the legs, is hinged between the middle pair of legs and is operated by hydraulic pressure: The nymph contracts its body musculature, forcing its fluid blood into the labium and causing it to extend forward twice or more the length of the nymph's head.

The nymphs molt some 10 to 15 times and at the last molt (or eclosion) winged adults emerge. This is one of the most dramatic events in nature and certainly the most dramatic event in any dragonfly's life: It changes in a few hours from a water-dwelling, water-breathing creature to an airborne, air-breathing one.

The nymph crawls from the water, fixes its claws firmly to soil, vegetation or rock, and waits for its skin to dry. Then, by muscular effort, it swells its body until the nymphal skin splits along a weak seam on the back and slowly the insect forces its way out of the skin. It pumps blood into the soft folded wing pads, stretching the wings to their fullest extent. The newly expanded wings of the blue darner (at right) have a greenish color, owing to the blood yet retained in the wings. Next the segments of the abdomen will extend like a telescope, becoming slightly longer than the wings. And then a dragonfly will take flight. The maiden flight of the dragonfly is a weak flutter on soft, moist wings. In a day or two the blood recedes from the wings, the veins harden and turn black, and the dragon is master of the air.

Dr. Harwood, retired from an industrial research career, searches Ohio and other areas for dragonflies.

Last nymphal skin of *Boyeria grafiana* clings to concrete long after adult emerged. At right, a female *Aeshna palmata* emerges. Tinged green with fresh blood, wings will dry, extend to side.

By Dorothy B. Porter

The black role during the era of the Revolution

A little-known chapter of Afro-American history is the subject of a show at the Smithsonian's National Portrait Gallery

The first group of 20 captive Africans was brought to Virginia in 1619. What happened to them and to thousands of slaves who subsequently arrived on our shores is not recorded adequately in the pages of American history. But the stories of many exceptional individuals—soldiers, scientists, writers, clergymen and educators—are slowly coming to light as researchers investigate sources hitherto unused.

The varied roles and widespread influence of black leaders during the founding years of this country is the subject of a major exhibition, "The Black Presence in the Era of the American Revolution, 1770-1800," currently (through September 3) at the Smithsonian's National Portrait Gallery in Washington. It is a challenging theme for the Portrait Gallery because, among the hundreds of portraits painted during this period, identifiable portrait studies of black Americans are rare. Consequently, the show contains few portraits but a great many documents—prints, broadsides, petitions, poems and letters—that help fill in the picture of these little-known Americans.

Before the Revolution, slaves in Massachusetts wrote and submitted at least five petitions pleading for freedom. In January 1773, the General Court at Boston received what is probably the first petition of slaves praying for relief from bondage. And in June another petition written by slaves was presented to the Massachusetts House of Representatives. It urged that slaves be allowed to work one day a week for themselves in order to buy their freedom. They hoped to "procure money to transport ourselves to some part of the coast of Africa, where we propose a settlement."

Even earlier, individual slaves had made a determined effort to obtain their freedom through the courts. In 1770, James, a slave owned by Richard Lechmere of Cambridge, Massachusetts, brought suit against his master for keeping him in bondage. This plaintiff's victory encouraged other such suits.

Then there was Elizabeth Freeman (see p. 56), more familiarly known as "Mum Bett," who was one of the first to test the Declaration of Rights of the Massachusetts Constitution, which declared that "all men are born free and equal." No longer willing to take the insults and physical abuse inflicted upon her by her master, she ran away. He appealed to the law to recover her. But Elizabeth persuaded a young lawyer with antislavery ideas to take her case. The suit was tried in 1781 and the jury absolved her of wrongdoing, thereby making her one of the first black women to obtain her freedom through the courts.

At the beginning of the Revolutionary War, slaves and free Negroes were barred from enlisting in the Continental Army but, in the face of possible defeat by the British, many in the New England states were accepted. Late in 1775, George Washington issued orders authorizing the enlistment of free Negroes as soldiers and they continued to serve until the close of the war. Most of them enlisted voluntarily, some were drafted and others—especially slaves—were entered as substitutes for other persons.

During the Revolutionary period black men were not only fighting but were laborers, coopers, blacksmiths, carpenters, bricklayers, weavers, shoemakers, cabinet- and chairmakers, soap-makers, tallow-candlers, engravers on gold, brass, silver and copper, as well as printers. They served in the minuteman companies of Massachusetts, in the Northern states' militia and in the Continental forces. Negro seamen were also aboard American privateers.

Some join His Majesty's troops

Many slaves, desiring liberty, left their masters to join the Royal forces when John Murray, Earl of Dunmore, issued his proclamation in November 1775: "I do hereby further declare all indented Servants, Negroes or others (appertaining to Rebels) free that are able and willing to bear Arms, they joining His Majesty's Troops as soon as may be, for the more speedily reducing this Colony to a proper Sense of their Duty, to His Majesty's Crown and Dignity."

Mrs. Porter, associated with Howard University, writes frequently on black history. Her most recent book is Early Negro Writing, 1760-1837.

Yale University Art Gallery

Peter Salem, shown with musket behind Lieutenant Grosvenor, was a former slave who made history at Bunker Hill when he was credited with killing a British major. This small oil is the work of John Trumbull, who witnessed the actual battle and painted it 11 years later in his London studio.

Black heroes won distinction in many battles. Crispus Attucks, a slave who had escaped from his master, became a martyr when he was the first to fall during the "Boston Massacre" on March 5, 1770, the day the first blood of the Revolution was shed. Another former slave, Peter Salem (see p. 53), made history in the Battle of Bunker Hill. At the very moment the British Major John Pitcairn, leading one of the enemy's most desperate charges, exultantly cried, "The day is ours," it is said that Peter Salem shot and killed the major, although there have been other claimants. Peter Salem was presented to George Washington for "having slain Pitcairn."

In the annals of espionage, the name of James Lafayette should be more widely recorded. James, a slave owned by William Armistead of New Kent County, Virginia, with his master's permission offered his services to the Marquis de Lafayette, whose troops were camping and marching in the area. James' ability as a spy was so great that Lafayette's appraisal of him prompted the Virginia Assembly in 1786 to grant him freedom and an annual pension of $40.

There were two all-black units that fought in the Continental army. The better-known of the two is the First Rhode Island Regiment, which came into being when the state found it impossible to supply its necessary quota of white troops. The Rhode Island legislature voted to grant freedom to any slaves who volunteered to fight.

Almost nothing is known about the second unit, a Massachusetts company called the "Bucks of America." At the end of the Revolutionary War, John Hancock presented the "Bucks" with a silk banner (see p. 56) bearing his initials and those of Washington, as a "tribute to their courage and devotion."

The almanac publisher was self-taught

In science and literature, the Negro made considerable contributions prior to 1800. Benjamin Banneker, born in 1731 in what is now Ellicott City, Maryland, published six almanacs which appeared from 1792 to 1797 in Pennsylvania, Maryland, Delaware and Virginia. Banneker's knowledge of astronomy and mathematics came largely through the reading of books lent to him by George Ellicott, a well-educated man for whom Ellicott City, near Baltimore, is named. Banneker sent a copy of his first almanac, together with a letter concerning the emancipation of the Negro race, to Thomas Jefferson, then Secretary of State. Jefferson replied at once and thanked him for the almanac. To Banneker he wrote in part: "No body wishes more ardently to see a good system commenced for raising the condition both of their body and mind, to what it ought to be, as fast as the imbecility of their present existence, and other circumstances which cannot be neglected will admit."

James Derham, born a slave in Philadelphia in 1762, became a medical apprentice. At first he helped his master, a physician, in compounding medicines and in caring for some of his patients. After the death of his master, he eventually became the property of a surgeon to the Sixteenth British Regiment, under whom

This early 19th-century papier mâché tray shows the Reverend Lemuel Haynes with his white congregation.

he performed many duties during the war. After the war he was sold to Dr. Robert Dove of New Orleans, who employed him as an assistant. Because of Derham's ability in medical matters, Dr. Dove liberated him. Derham was so well acquainted with the art of

healing that he commenced a lucrative practice of medicine in New Orleans.

Beginning in 1760, poems, essays, travelogues, biographies, speeches and orations by black Americans appeared in broadsides and pamphlets. Briton Hammon, one of the earliest of the black authors, published his narrative in 1760—an amazing story of the "many hardships" he underwent between leaving his master's

Museum of Art, Rhode Island School of Design

house in Marshfield, Massachusetts, in 1747 and his return to Boston several years later. Another Hammon, named Jupiter, has the distinction of being the first black poet to be published.

Phillis Wheatley was by far the most productive and popular black writer of the period. Brought from Africa in 1761, she was sold in the Boston slave market. Fortunately, she was purchased by a benevolent white woman, Mrs. John Wheatley, who saw that she learned to read and write. She began to write poetry at the age of 17. In 1770 her first poem was published as a broadside. The first collected volume of her poetry, *Poems on Various Subjects, Religious and Moral,* appeared in London in 1773. Before 1835, her poems had gone through some 30 editions and were published in London, Halifax, Boston, Philadelphia, Albany and Newport, among other cities.

Black clergymen probably exercised the most influence. One of the most extraordinary was Lemuel Haynes (left). Born in West Hartford, Connecticut, in 1753, he was ordained in 1785 and, after preaching a few years in Connecticut, he became pastor of a white Congregational Church in Rutland, Vermont, where he remained for 30 years. Several of his sermons were printed. One of the most popular went through numerous printings before 1835.

Two clergymen who played a crucial role in the development of black religious independence were Richard Allen, Bishop of the African Methodist Episcopal Church, and the Reverend Absalom Jones (see p. 57), founder and first priest of St. Thomas African Episcopal Church. Allen, born a slave in Philadelphia in 1760, was converted to Methodism in 1777. Jones was born a slave in Delaware in 1746. At 16 he was taken to Philadelphia, where he, too, became a Methodist.

They started an "African church"

Before they became religious leaders, Richard Allen and Absalom Jones attended Sunday morning services along with whites at St. George's Methodist Episcopal Church in Philadelphia. As the attendance of blacks at church services increased, white Methodists became increasingly hostile toward them. Allen and Jones decided to quit St. George's and were followed "in a body" by the rest of the Negro worshipers.

Allen and Jones felt the necessity to start a separate place of worship for black people. Their chief opposition came from the white Methodist clergy, which ridiculed the idea of an "African church" and tried to prevent it. Despite the harassment, Allen and Jones formed in 1787 the Free African Society, which later evolved into the St. Thomas African Episcopal Church and the Bethel African Methodist Church.

The Free African Society in Philadelphia was organized for benevolent as well as for religious purposes. In other cities, similar black societies were formed. In Charleston, South Carolina, the Brown Fellowship Society was organized in 1790. And in Boston the African Society was established in 1798.

Massachusetts Historical Society

Elizabeth Freeman, shown in a miniature watercolor, won her freedom in a Massachusetts court in 1781.

In addition to organizing themselves into mutual aid and religious societies, blacks established Masonic and other secret societies. Prince Hall, who served in the Revolution as a skilled craftsman, was one of 15 free blacks who, in 1775, joined an army lodge of Free and Accepted Masons attached to a British regiment stationed in Boston. When the British departed, the blacks were given a qualified permit to go on meeting as a Masonic lodge. Prince Hall later applied for a permanent charter, which was granted. Finally, in 1787, the African lodge was formally organized in Boston with Prince Hall as Master of the world's first lodge of black Masons. Earlier, in 1770, he had signed a petition with others which was presented to the General Court of Massachusetts, praying for abolition of the slave trade. Perhaps no other black did more to seek to improve the economic, social and spiritual condition of the Negro and to secure the emancipation of slaves during the era of the Revolution.

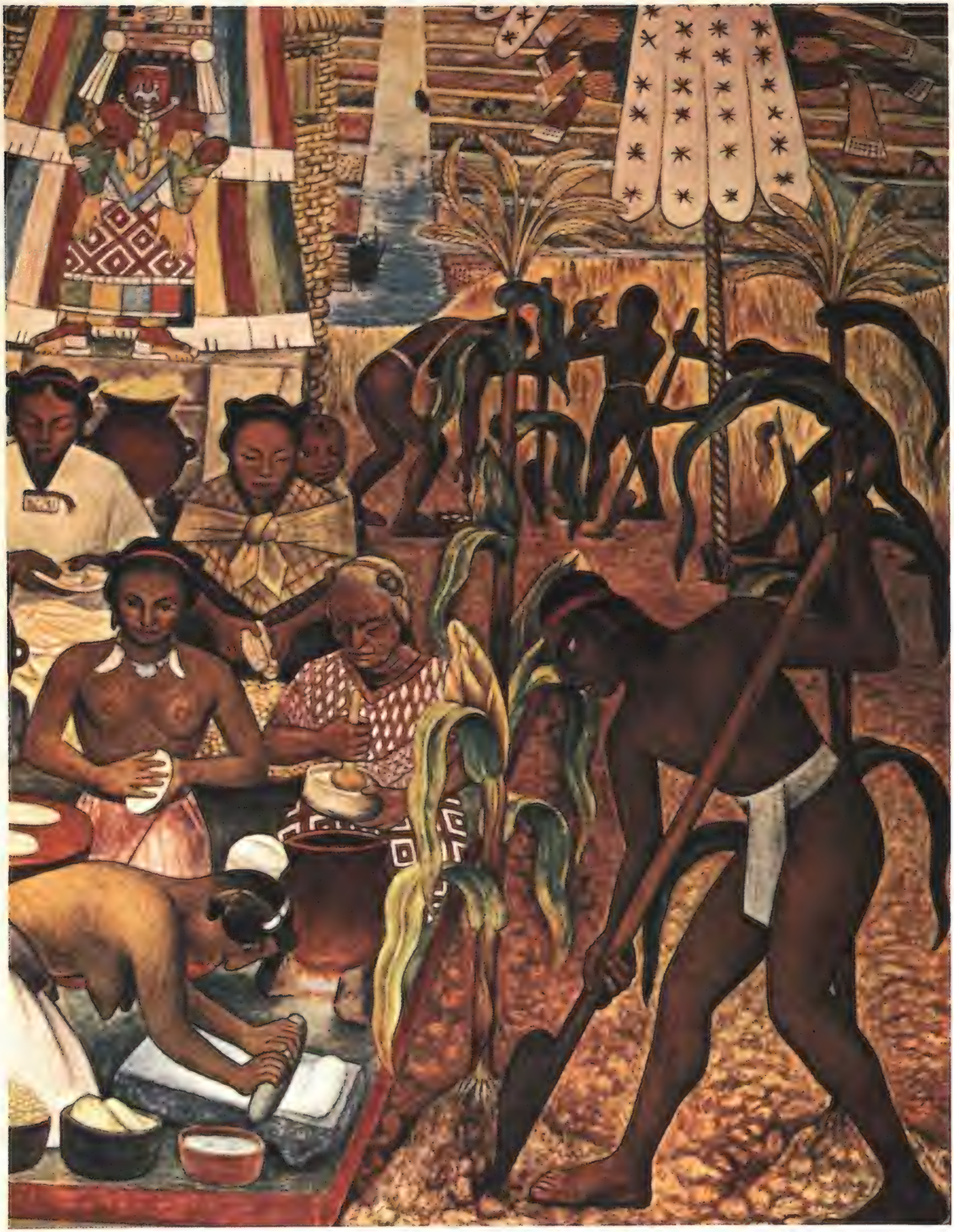
The historical record reveals that the "black presence" was felt everywhere during the Revolutionary era, even though it was frequently ignored at the time and minimized in later years. But it is becoming increasingly clear that, even then, blacks were making a positive contribution to American history and culture.

Massachusetts Historical Society

The Wilmington Society of the Fine Arts, Delaware Art Museum

After the Revolutionary War, John Hancock presented this silk flag, with his initials, to Boston's all-black regiment of soldiers, "the Bucks of America." It is the only known relic of the unit.

Absalom Jones, born into slavery, became the first U.S. black to be ordained an Episcopal priest. This portrait was painted by Raphaelle Peale in 1810. Never before shown, it has been restored by the Portrait Gallery, where it is on indefinite loan.



Corn grows, is harvested and is ground into meal
in this mural depicting the ancient Aztec corn culture
by the late Mexican artist, Diego Rivera.
It is in the National Palace in Mexico City.

By Alan Linn

Corn, the New World's secret weapon and the builder of its civilizations

Indian cultures and settlers whose lives it saved revered it, and research into its origin is vital to today's beneficiaries

On Corn Hill in Truro, Massachusetts, there is a plain bronze plaque dedicated to a plant. The inscription is in the words of William Bradford, governor of Plymouth Colony, written in 1621:

> *And sure it was God's good providence that we found this corne, for else we know not how we should have done.*

In point of fact, Governor Bradford and the Pilgrims cannot claim credit for "finding" the corn, even under divine supervision. Captain John Smith was more accurate when in 1607 he wrote gratefully (he was starving), "It pleased God . . . to move the Indians to bring us corn," but even he denied the Indians any credit for their hospitable act. They were instruments of God's innate friendliness toward colonists.

Far grander monuments lie some 1,500 miles southwest of the one on Cape Cod, deep within the tangled jungles of Mexico's Yucatán peninsula. Here you can stand atop pyramids hundreds of feet above the jungle floor and gaze across courtyards, ball parks, temples and sacrificial altars, built more than a millennium before the Pilgrims huddled at Plymouth. Almost every place the eye rests it can discern a carved facsimile of an ear of corn or some other symbol concerned with its cultivation.

If an observer could stand on a much higher pyramid, one tall enough to make the Americas appear like a map, he could not help but notice similar monuments to corn spread throughout Mesoamerica, Peru and Bolivia, adobe cities in the sides of cliffs in the Southwestern United States and earthen mounds heaped up along the Mississippi River and its tributaries. The names of the builders would ring euphoniously in his ears—Olmec, Maya, Inca, Toltec, Aztec, Zapotec, cliff dwellers, Mound Builders—and each of them depended on corn.

The Americas are covered with other monuments to corn. Cathedral-like grain elevators in the corn belt, glass-and-steel spires in modern cities, roads and highways and trains and factories and universities—all owe their debt to corn. It is the core of American civilization, the most efficient device for trapping the energy of the sun and turning it to our uses. It is the top crop, earning $7.1 billion a year, more than double that of wheat. Corn is indeed, as historians have remarked, "the grain that built a hemisphere."

In its own way, and perhaps more beautifully, corn is a monument to Man. Look at it the next time you have corn on the cob or are surprised by one of those tiny ears of corn in your hors d'oeuvres at a cocktail party. The ear is the ultimate in efficient food packaging, a highly specialized flower cluster with hundreds of naked, energy-crammed seeds, compactly arranged on a rigid cob enclosed in husks. Remarkable!

"An ear of corn has no counterpart anywhere else in the plant kingdom," says Dr. Paul C. Mangelsdorf, a retired Harvard professor of botany, who has spent nearly all his adult lifetime studying the plant. "There is nothing like it either in nature or among cultivated plants." But the ear is a paradox, for it cannot live without Man. But for him, its seeds would fall on the ground and sprout together in a tangled mass. This is

Free-lance writer-photographer Alan Linn has done articles for agricultural magazines and wrote about barbed wire in the March 1972 SMITHSONIAN.

Teosinte is a highland grass that, through crossbreeding with corn, probably helped produce "supercorn."

a case of what Darwin called parallel evolution: Corn and Man have become interdependent.

It seems almost a shame that this perfect plant has placed its future in the hands of so capricious a creature as Man. On the other hand, men have greatly benefited the plant. When corn first met our primitive ancestors its cobs were about the size of a stubby pencil, contained some 50 tiny kernels and were supported by a short spindly stalk. Some modern hybrids have ears nearly as long as a man's forearm, bearing more than 1,000 large kernels. Plant breeders, mostly since World War I, have made corn higher in protein (field corn), higher in sugar (sweet corn), disease resistant, insect resistant, mold resistant, drought resistant and wind resistant. Plants have been bred to bear ears at a uniform height for easier mechanical harvesting. Farmers have learned to plant them with a density per acre that allows each one to absorb the maximum possible sunlight.

In most cases, improvements in modern corn have come from using ancient types as breeding stock. All of today's major types of corn—dent, flint, flour, pop and sweet corn—were in existence by the time Columbus discovered America. When some of these ancient races were inbred (bred to close "relatives"), the vigor of successive generations decreased. But when separate inbred lines were crossbred, the result was an explosive burst of hybrid vigor—one of the most important breakthroughs in all agriculture. Between 1929 and 1969 average corn yields in the United States shot up from 26 bushels to 80 bushels per acre.

The results have been a bounty. Captain Smith's corn farmers could barely feed themselves, even with Indian tutoring. Henry A. Wallace, a corn breeder and farm editor before becoming Secretary of Agriculture and Vice President under Franklin D. Roosevelt, introduced hybrid corn seed commercially in 1926. Before then, one farmer fed about nine people. Today a corn-belt farmer can grow enough corn to produce enough livestock products to feed about 400 people (it takes ten pounds of corn to raise a pound of steak). Of course, mechanization, fertilizers and pesticides aid this production, but corn now has the capacity to repay all these inputs.

One Ohio farmer found he could significantly increase corn yields by putting aluminum foil between the rows to throw sunlight on the *bottom* of the leaves and by keeping the corn growing all night with high-powered lights! It is generally true that the more we learn about corn's origins, the more we can improve the modern crop.

After three centuries of speculation about which came first, the corn or the Indians who planted it, several tiny charred vegetable scraps were found in Mexico's Tehuacán Valley, about 150 miles south of Mexico City. Their discovery can be compared to that of the Dead Sea Scrolls and the ruins of Troy, for these humble pieces have caused the rewriting of the book about our transition from savagery to civilization.

The scraps were found in a large cavelike cliff shelter near Coxcatlán by Dr. Richard S. MacNeish, director of the Robert S. Peabody Foundation for Archaeology in Andover, Massachusetts. He had sought them for a decade and through some 35 other excavations. A workman digging through the rubble of ancient human occupation six feet below the floor of the modern cave found the black remains, about the size of a cigarette butt. MacNeish, who has the face

Tiny primitive corn, two-colored Indian variety and golden modern ears span centuries of progress.

of a philosopher and the physique of a boxer, leaped into the trench and, swinging the pick for an hour, unearthed two more similar remnants. He hurried his crew back to the local *cantina* for a congratulatory beer and then wired home, "We've hit corn!"

A short time ago, MacNeish recalled that day in Mexico: "A most exciting moment. There they were, small black cobs, the source of energy, comparable to our discovery of the energy within the atom, which enabled primitive man of the New World to carve his empires in the jungle."

The cobs were identified by Mangelsdorf at Harvard as "the earliest corn yet found . . . very close to wild." Carbon dating showed them to be about 5,600 years old. The point in time and space where the paths of Man and corn had crossed seemed about to be revealed.

In the dozen years since his finding the first corn in Tehuacán, and in many new excavation sites, MacNeish has found about 26,000 more intact cobs, 50,000 plant and animal remains, 10,000 artifacts such as projectile points and 500,000 potsherds. Today, in the orderly clutter of his workrooms, he is piecing together a mosaic of a people's way of life from the beginnings of human occupation. (Four volumes of a planned six-volume report on Tehuacán by MacNeish and the team of scientists who cooperated on the project have been published by the University of Texas Press.)

Some 12,000 years ago, Man arrived in the Valley of Tehuacán, a 20-by-70-mile basin ringed by the Sierra Madre Oriental and the Mixteca Hills. In the beginning there were probably no more than three family groups of four to eight people each (most campsites had only two fireplaces). They were primarily hunters, changing camps seasonally in search of jackrabbits, rats, birds, turtles and other small animals and some plant foods such as pods, seeds and cactus leaves. Their meager tools were simple flaked-stone implements, leaf-shaped projectile points and scrapers for working hides and wood.

Occasionally the nomads managed to snare or ambush one of the now-extinct horses or antelopes. This life is often portrayed by museum muralists as the "Great Mammoth Hunt," depicting the giant animal going down in a hail of spears. Actually, as MacNeish says, quoting a colleague, "They probably found one mammoth in a lifetime and never got over talking about it."

About 6700 B.C. the Tehuacanos began a shift from hunting to gathering wild plants. The Pleistocene era, the last Ice Age, was drying up, and game animals were moving on or becoming extinct. When plants were abundant during the wet season, the families could gather in temporary settlements. They were eating a few plants such as squash and avocados, but they had no corn and probably often starved. MacNeish speculates that about this time the idea occurred to these nomads: "If you drop a seed in the ground a plant comes up."

About 5000 B.C. the concept of agriculture was put to use. The inhabitants were still basically plant gatherers, but they domesticated more and more plants, including the water-bottle gourd, squash, beans, peppers, amaranth—and, for the first time, corn. Their stone implements, now polished, included the forerunner of the classic New World roller and stone device for grinding corn—the *mano* and the *metate*—which can still be seen in almost every rural Mexican village. However, the great Mexican food staple, the tortilla, had not yet been invented. The Tehuacanos probably ate corn as a gruel, like cornmeal mush today.

Seeds of civilization

Their more efficient use of plants gave these people surplus energy; they could afford to meet seasonally in larger numbers at some favorite collecting spot, and stay together longer. As their dependence on agriculture increased, the importance of rainfall and weather became more crucial to them. The shaman and religious functions in all likelihood gained more significance, not only in rituals of birth and death but in those of planting and harvesting. Their subsistence agriculture, says MacNeish, "can be regarded as the foundation for the beginning of civilization."

The inhabitants of the Tehuacán Valley were growing about 30 percent of their food by 3400 B.C. They

"That's where the tall corn grows"—in this case not in "Ioway," but near Greeley, Colorado.

had many plants, some of which had been domesticated earlier than corn, but only corn furnished them with a storable energy reservoir that would last through the dry season and eliminate the need to move on. For the first time, Americans settled down and lived in hamlets the year round.

By about 1500 B.C. the hamlets formed a solid corn-nurtured base for a civilization stretching 4,000 miles from central Mexico to southern Peru. But the only evidence of art or religion from this period is clay figurines, and there is nothing to indicate a political organization above the village level.

Alongside the cultivated patches of Indian corn grew closely related highland grasses: teosinte (an Anglicization of the Aztec name *téozinté*) and *Tripsacum,* which had not been changed by the centuries of Man's selection and cultivation. These plants grow small ear-like seed heads and tassels which produce millions of grains of pollen. With every spring breeze, clouds of pollen mixed and fertilized them. The result was the same explosive burst of hybrid energy which revolutionized modern agriculture. Accidental hybridization gave the people of Tehuacán Valley "supercorn."

"It was this corn," Dr. Mangelsdorf has written, "more than any other, which initiated the rapid expansion of agriculture that was accompanied by the development of, first, large villages and, later, secular cities, the practice of irrigation, and the establishment of a complex religion."

Mexican farmers still revere two races of Mexican corn resulting from this hybridization, Nal-Tel and Chapalote, and grow it next to their modern corn for good luck.

Scientists think it may have been during this period that Mesoamerica became divided into two cultural units. One was the highland culture, such as in Tehuacán, based on irrigation agriculture and culminating in the rise of secular cities. The other was the lowland culture, beginning with the Olmecs of Veracruz, known to most people today by the huge, thick-lipped stone heads that have been discovered half-buried in the jungle. The first of these, six-and-a-half-feet tall and weighing ten tons, was brought to the world's attention by Dr. Matthew W. Stirling of the Smithsonian Institution in 1938. The lowlanders practiced slash-and-burn agriculture and built the classical ceremonial cities with immense stone pyramids, ruled by a hierarchy of priests.

Despite their differences, highlanders and lowlanders relied on the same crop. As MacNeish says, "It was

The real
Man in his ignorance has always assumed that the earth would rejuvenate herself, no matter what he did.

mother earth father sky navajo sandpainting artist: alfred dihyia

The earth can lose her resiliency. Her waters are polluted, her soil is becoming dust, some of her trees are poisoned. Someday she may be beyond her ability to heal herself. But what we do to her we do to ourselves.

The Indians call the earth their mother.
We must protect the earth. We must learn to live in harmony with her; we must learn her moods and rhythms. We must love the earth.

The ideal
When man and nature are in harmony, the land is happy. There is great strength in this idea.

AtlanticRichfieldCompany

highland corn that made the lowland culture jump."

The Tehuacanos were not the first or only people in the Western Hemisphere to bring wild corn under cultivation. MacNeish believes the New World's invention of agriculture was fragmented and that some other areas, probably nearer Mexico City, were slightly earlier. However, the origins of civilization in Tehuacán are the first to be traced. The valley has yielded an almost unbroken detailed record of nearly 12,000 years of prehistory—the longest span for any New World area and the most complete record for either the New or Old World.

The actual origin of corn is still unclear. The Aztecs believed their hero-god, Quetzalcoatl ("who created mankind from his own blood"), once turned himself into an ant in order to steal a grain of corn from the ants' treasury inside a great mountain and give it, the gift of agriculture, to Man. Many modern theories seem just about as likely. Did it originate (1) from teosinte, (2) from primitive "pod" corn, or (3) along with the closely related teosinte and *Tripsacum*, from a common ancestor, now extinct?

The teosinte theory was favored until Mangelsdorf's experiments indicated teosinte was the daughter, not the mother, of corn. Mangelsdorf favors the pod corn theory. He believes the pods of chaff (the tissues between the kernels which stick in your teeth when you eat corn-on-the-cob) extended over the kernels; the husks opened at maturity, allowing the kernels to seed themselves without the help of man. Some ancient corn resembles this form. Yet recent experiments by Professor George W. Beadle of the University of Chicago are giving new impetus to the teosinte theory.

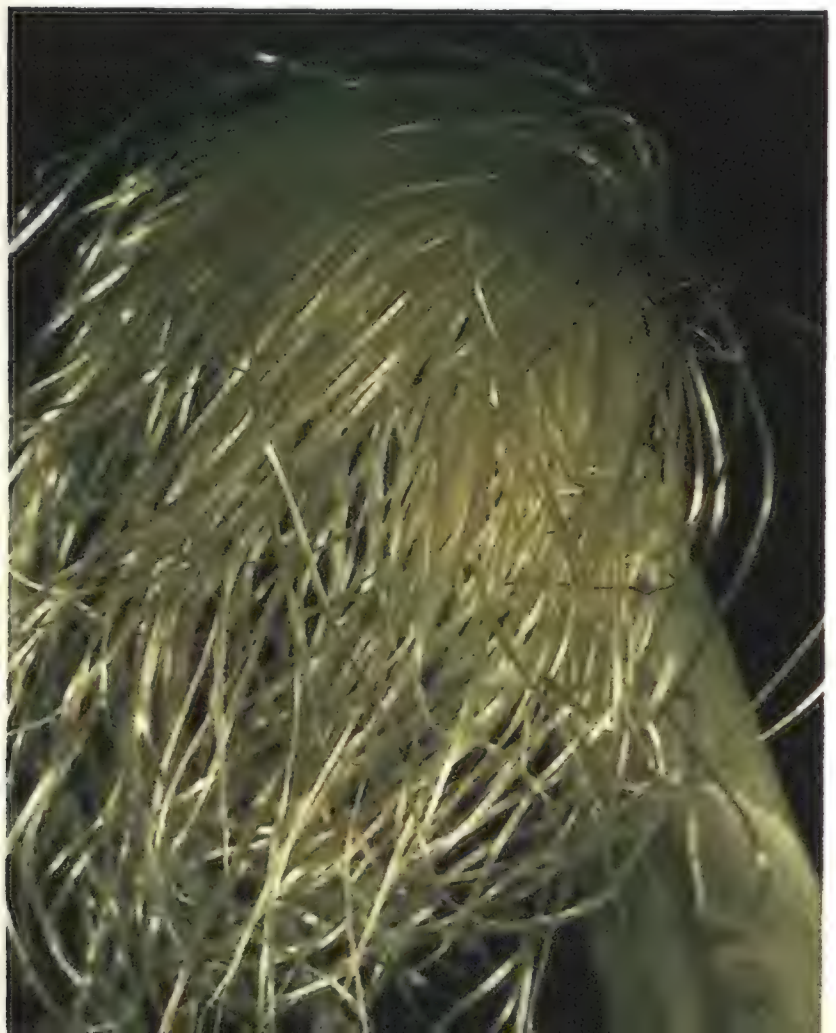
The search for corn's beginnings has a practical aspect, for it is still the most important grain of the Americas and if geneticists can identify corn's predecessors, they would have important new gene pools with which to improve modern hybrids. One example is a new variety called "prolific" corn. Under good conditions it produces some 20 percent more than other varieties by growing two or three ears on a plant (some modern hybrids have only one large ear). Under stress conditions, such as drought, this corn still manages to produce one ear, where other varieties can grow none at all. This corn was bred in part from an "archaic" South American popcorn.

A more dramatic example of our need for new genes came with the corn blight of 1970, which reduced the nation's corn production by some 700 million bushels (worth about $1.33 per bushel). The devastation resulted from too narrow a gene pool for breeding our corn crop. The corn was so similar that when a damaging disease came along, virtually every field in the country was susceptible. Here was a case of carrying all our corn, genetically speaking, in one basket.

Discovery of corn's true family tree could produce a "son-of-supercorn." Even though the benefits would not change our lives as much as "supercorn" affected the Tehuacanos and other primitive cultures, it could not help but feed more of our hungry.

It behooves us in the late 20th century to heed the Zuñi Indian proverb:

"Love and cherish your corn as you love and cherish your women."



Corn pollination transfers pollen from sacs (above) on the tassels to corn silk (left), so nostalgic to the memories of former behind-the-barn smokers. Magnified photograph (right) shows pollen on the silk.

By Alfred Friendly

Search for tomb in Egypt uncovers vast animal cult

Britain's top Egyptologist, Walter Emery, dug the sands for seven years; he failed to find Imhotep but did uncover a surprising culture

Professor Walter B. Emery of London University supervises Egyptian crew at North Saqqara dig.

At first glance the spectacle made no sense. Incongruously, here were a couple of acres of blinding Egyptian sand peppered with potsherds from the age of the Ptolemies. This is "modern stuff" to an Egyptologist, scarcely 2,000 to 2,200 years old. Yet these finds occurred in the archaic necropolis of North Saqqara, a four-square-mile place of the dead, whose tombs date from ancient dynasties, five millennia old.

Why should remnants of two such disparate epochs be mixed in the same place? The archaeologist standing on the spot, a half-hour's drive from Cairo, wrestled with the enigma, then ventured a theory. Could this strange juxtaposition betoken an old holy spot to which latter-day worshipers had thronged?

If this were a shrine, then whose? Was it, in fact, the tomb of Imhotep, vizier to the Pharaoh Zoser, builder of the world's oldest stone monument, the Step Pyramid? He was the first physician, deified as the God of Medicine and renowned in document and legend.

The man who asked these questions in 1956 was Walter Bryan Emery, Britain's foremost Egyptologist. After 17 years his hypothesis remains unproved. But in his search for Imhotep, Emery uncovered instead one of the greatest animal-cult centers ever found. The new light it casts on late Egyptian civilization and the richness of the treasures it yielded make Emery's achievement one of outstanding significance.

At the time of his death in 1971, stricken in midsearch on the Saqqara plateau, Emery had spent 47 years in surveys and excavations in Egypt, heir to the mantle—and London University chair—of the great Sir Flinders Petrie. Emery was the last living Egyptologist to have been present at the opening of the sarcophagus of Tutankhamun (SMITHSONIAN, June 1972). He died confident that an equally great find, Imhotep's shrine, was in reach of his spade.

Beginning in 1924 at 21, Emery worked from one end of Egypt to the other. But he was known mainly for his work on the North Saqqara plateau, discover-

ing and studying the mastabas, or tombs, of the pharaohs and nobles of the earliest dynasties (3100-2613 B.C.). The urgent need to survey and excavate sites that would soon be flooded by the Aswan High Dam kept Emery from delving into the mystery of the strange "modern" potsherds for seven years. Not until 1964 did the Egypt Exploration Society, whose expeditions he headed, let him return to Saqqara.

Mastabas are boxlike underground chambers with inward-sloping mud-brick walls from 20 to 60 feet high. Burials were made from above by lowering sarcophagi and funerary treasures through shafts. Emery found a huge mastaba that had been reworked in such a fashion as to suggest that it was done as recently as the seventh and sixth centuries B.C.—the Saite period.

In clearing out one of its burial shafts, Emery broke through into a fantastic set of tunnels. And in this enormous complex of galleries, 30 feet underground,

Workers pore over thousands of potted hawks in a gallery. Sun god Ra is often shown hawk-headed.

he found himself literally up to his eyeballs in ibises—hundreds of thousands of mummies of these sacred birds. They had been dipped in bitumen, then wrapped in linen strips in such a way as to form intricate herringbone patterns with more than 100 varieties of decorations. On many of the bandages small figures of gods and sacred animals had been appliquéd. Finally, each mummy had been sealed in a cone-shaped pottery jar.

Further excavation revealed that Emery had penetrated into a labyrinth of seemingly endless chambers stacked from floor to ceiling with ibis mummies, laid down like bottles in a gargantuan wine cellar. He was, in fact, in one of the ibis catacombs, first reported by explorers in the 18th century.

In two seasons Emery and his team explored about a mile of communication passages and scores of tunnel-like rooms intersecting them more or less at right angles. About 12 feet high and 8 feet wide, some were empty but most were packed solid with ibis mummy pots, and Emery never totally succeeded in clearing even one of them. One of his associates, Dr. G.T. Martin, who now carries on Emery's work for the Egypt Exploration Society, once tried to calculate the probable number of jars in the explored area and arrived at a figure of 1,250,000. Even more staggering, when Emery came to recall it, was a report of the French explorer Paul Lucas, who penetrated the galleries as early as 1716. He declared that he descended a burial shaft and, playing out a string 2,000 yards long behind him, pushed through the labyrinth to the end of his tether. He went about twice as far along a single passage as Emery ever went—and was still nowhere near the end. His account had been widely disbelieved. It appears now that he was telling the truth.

Two seasons' work uncovered a great volume of artifacts from the Saite period and even a couple of centuries later, the Ptolemaic. There were inscribed votive pottery fragments, some papyrus fragments, many other pieces of statuary, furniture and carved objects. It appeared that in these later times the areas around the much earlier mastabas had been cleaned out, the mastabas all leveled to a uniform height, and the intervening spaces filled with sand and rubble. The rock below was hewn out for the ibis catacomb.

From the objects, wall markings and deciphered prayers and petitions on papyrus shreds and ostraca, it was clear that this was a place of pilgrimage, where worshipers came to make prayers and offerings, including jars of ibis mummies. Small wonder that the sacred bird is extinct in Egypt.

The author appeared in SMITHSONIAN *with articles on sculptor Michael Ayrton in January 1973 and on early Christian Aquileia, December 1970.*

A million mummified ibises is all very well, but what had they, and all the rest of the finds, to do with Imhotep? A great deal, Emery was convinced. First, the ibis was closely associated with Imhotep's worship. One of his titles was "First Chief One of the Ibis." Over the centuries Imhotep acquired the attributes of the god Thoth and became associated with Thoth's sacred animals, such as the baboon; representations of them and of Thoth were discovered in abundance.

Most significant, however, was the fact that the underground passages were dug in an area crowded with mastabas, erected almost side by side. This meant that the tunnels could not avoid intersecting dozens of burial shafts, by then filled with sand and rubble which promptly flowed into the newer workings. The Saite-Ptolemaic diggers, therefore, were obliged to haul out the rubble and build retaining walls, false floors and ceilings in the old shafts. Why had they gone to such enormous work when there was land that had never been built upon less than half a mile away? The answer must be that this location was very sacred; the ibis catacombs had to be in the holy place, under or near a shrine itself. Other evidence indicated that Imhotep's tomb was in this area. Emery became convinced that he was near it—and near the famed Asklepieion which was built when Imhotep became revered as a god and was identified with the Greek healer Asclepius.

Dangerous work in crumbling passages

But "near" was not good enough. Emery was blocked from further exploration of the ibis corridors by the same burial shafts that frustrated the earlier tunnelers. Walls and false ceilings had long since broken down, and tons of debris once again flooded the passages. Emery's project became extremely hazardous.

So Emery turned in the third season to an area about 250 yards to the north of the ibis galleries, where aerial photographs showed the vague outlines of a rectangular enclosure, its axis askew from those of the Archaic and Old Kingdom mastabas. It took several seasons' work to reveal that the outline dimly seen under the sand was an enclosure within mud-brick walls about 80 yards long, 40 yards wide and at least 15 feet deep. It was a "casing" to enclose the fill for the huge forecourt of a temple and adjacent shrines.

No one could watch the excavation as I did a few years ago and fail to catch the excitement. Some 350 Egyptian workmen hauled out debris, leather or straw baskets on their shoulders, trudging to the rhythm of an old chanteyman and joining him in the choruses. Every few minutes a digger, using a mattock with surgical gentleness to clear the sand, would remove something from the hole and pass it to Emery or another archaeologist on the team. It could be a fragment of

Linen-swathed mummy of a sacred ibis bearing image of ibis-deity Thoth is one of a million-plus found.

pottery or papyrus, a tiny figurine, a woven sandal, a piece of heavily gilded and painted wood from an ancient altar or statue.

In subsequent seasons the foundations of a substantial temple were discovered on the east side of the forecourt, buried under a latter-day Christian enclave, perhaps a monastery. The temple dated from the time of Nectanebo II, the last truly "Egyptian" pharaoh who reigned until the conquest by Alexander the Great (332 B.C.) and the subsequent rule of the descendants of Alexander's general, Ptolemy.

Treasures were found in staggering numbers, many of great beauty and all of enormous scholarly value for the knowledge they shed on the religious life of Egypt during almost a millenium. Of particular importance are hundreds of fragments, some of substantial completeness, of papyrus and ostraca. They are largely temple documents: inventories, prayers, dreams and priestly interpretations of them.

In addition—something that led Emery more than ever to feel he was close to the healer Imhotep's shrine—the discoveries included scores of plaster models of parts of the human body: hands, legs, faces, arms, feet. They were precursors, surely, of similar representations, usually in silver or other metal, to be found on church walls throughout Catholic Europe, offered as petitions or in gratitude for cures.

Clearly, Emery had discovered a temple area that had been deliberately destroyed. Some of the contents of shrines and buildings had tumbled into the fill of the forecourt. Most were objects of veneration made in Saite-Ptolemaic times, but some dated from much earlier periods and appeared to have been deliberately concealed. Emery concluded there had been two destructions, the first at the time of the Persians' conquest of Egypt in 525 B.C. Subsequently, it would seem,

Imitation mummy of Apis, a sacred bull, was buried beneath cows that bore these chosen god-beasts.

Amun, king of gods, to whom Karnak's famous temple is dedicated, is sculptured on this bronze plaque.

the shrine was restored and continued until Roman times, for much Roman material was found in the upper levels. Then it was destroyed again, almost certainly in the time when the Byzantine Emperor Theodosius forbade all non-Christian worship throughout his empire. A great shrine, ostentatious in its paganism, would have become a prime target for demolition at the moment of his edict of A.D. 380.

Beginning in 1968, Emery found no less than three great galleries to left and right of the temple. The first is the burial chamber of some 500 baboons—sacred to Thoth-Imhotep. The creatures were mummified in a sitting position, carefully wrapped and then imbedded in rectangular casings of gypsum—like so many gangsters rubbed out and given cement coffins. Each was then enclosed in a wooden box and placed in a niche hewn from the rock wall of a two-level gallery, one passage above the other.

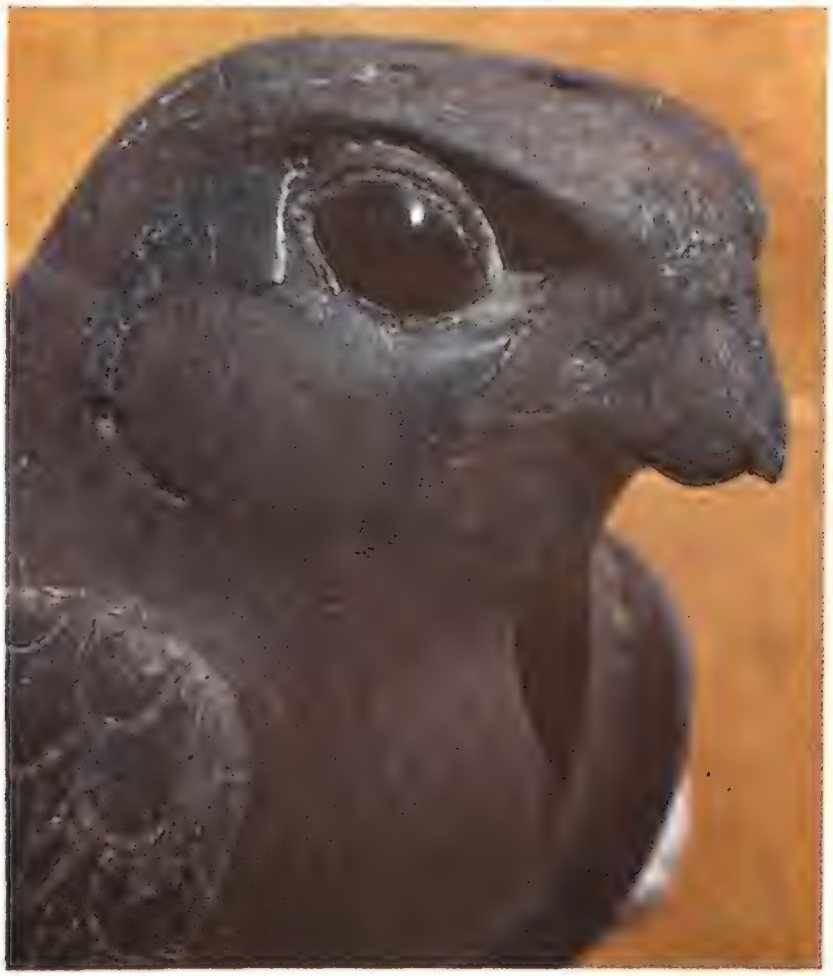
Only two of the coffins were found intact; the rest had been smashed at some time in the past, systematically, in what must have been a difficult and tedious piece of labor. The agents were almost certainly Theodosius' enforcers. Bones, wood and bits of concrete casings litter the galleries. Baboon skulls still snarl resentfully in the niches.

In excavating the baboon galleries, Emery's workmen one day plunged into a new set of tunnels below, once again stacked with potted birds—hawks this time, not ibises, although mummified in exactly the same way, with numbers again running to the hundreds of thousands. In one tunnel-like chamber, mixed in with the mummified hawks, a superb cache of temple furniture was discovered. Elsewhere, to Emery's amusement, a splendid collection of erotica showed up.

But it was another gallery, north of the temple, that proved to be the most momentous. For at least two seasons Emery had been uncovering torch handles, prayers to "Isis, Mother of Apis" and objects of her worship, and realized that a burial chamber holding the sacred cows, mothers of Apis, the sacred bull, was nearby. Its existence had been long known from documents and inscriptions but its whereabouts never. It was believed (correctly) to be similar to the famed Serapeum, Apis' burial place, which French archaeologist Auguste Mariette found nearby in 1851.

From earliest times the bull had been an object of worship as the apotheosis of strength and fertility. As Egyptian religion became more systematized, a new Apis, or deified bull, was chosen on the death of his predecessor. By the 26th Dynasty, in Saite times, the cult of the virgin cow Isis, mother of Apis, fertilized by a divine spirit, came into being. When the Apis died, it was buried in the Serapeum with ceremonies and gifts; when the Isis-mother died, she received the same

This bronze falcon has eyes of obsidian set in lapis lazuli. It was discovered in the Saqqara dig.



Blue faience statuette of a baboon is sacred to Imhotep. Hundreds of mummified baboons were found.

Throned Isis nurses her infant son Horus in a statue preserved by wrapping. There were many others.

reverential treatment, and was interred in the galleries which Emery found and named the "Iseum."

It extends from an entrance in the cliff behind the temple for about 50 yards and contains the sarcophagi of some 25 cows, each in a chamber entered from the central gallery. The great stone coffins are similar to those of the Serapeum, although not as large. But the Serapeum lay a few hundred yards deeper into the desert beyond Memphis than the Iseum, and thus a little more out of the way of Theodosius' Christian zealots. Although it suffered looting, it was not much smashed up. The Iseum, unfortunately, is. Nevertheless, to scholars, its discovery rates with Mariette's as one of the great achievements of Egyptology.

The enormous animal-cult center that Emery found was very probably ancillary to the Serapeum, the place of prime worship in North Saqqara. The temple and entrances to the four mummy galleries lay on access roads to the great street that led to the Serapeum. One must imagine them lined in ancient days with the stalls of the sellers of mummified ibis and falcons, baboons and possibly other animals (mummies of cats and dogs have been found in the area), like the stalls of candle-sellers around a European cathedral.

One is tempted also to imagine the scene at the chapels in front of the entrances to the animal mausoleums. Paved ramps lead up to the shrines. Gate foundations, courts and other structural parts have been excavated. One can picture how, each morning, the high priest of each sacred animal would bow his way to the gates, break the seal put on them the night before, open the huge doors to the shrine, remove the statue representing and embodying the animal deity, wash it, clothe it, bedeck it with cosmetics and jewelry, place a food offering before it (which the priest ate later in the day, as part of his perquisites) and perform other acts of worship. At sunset, the priest would undress it and place it back in its sanctuary.

It is in some such ambiance that one would expect to find the shrine of Imhotep, associated as he was in religious belief with the ibis, the baboon and, indeed, with the Mother of the Apis and Apis himself (with the selection of each new bull, it was taken to the temple of Imhotep to be "touched by the god" and thus consecrated). Although the shrine is certainly not in the sites Emery excavated, he was sure it was nearby. The evidence suggests it may well be, perhaps distant by hundreds of yards, perhaps only by the length of a spade handle. The find awaits a future excavator with Emery's dream in his heart.

Baboon skulls leer in a gallery where early Christians systematically smashed their "idolatrous" coffins.

American reporting goes on display

From the colonial postrider to the communications satellite, the men and machines that have brought two centuries of the news to Americans are now on permanent exhibit at the Smithsonian. Visitors to the Henry R. Luce Hall of News Reporting are confronted by an old-fashioned news wagon (turn page), traveling headlines illuminated by bulbs, the equipment of news reporting. A newsreel theater, complete with uncomfortable seats, projects events of the 1930s. "Antique" television sets broadcast news stories of the 1940s, and teletype machines tap out the current "flashes" while you watch. The exhibit was designed by Peter Marzio of the Museum of History and Technology, Washington, D.C.

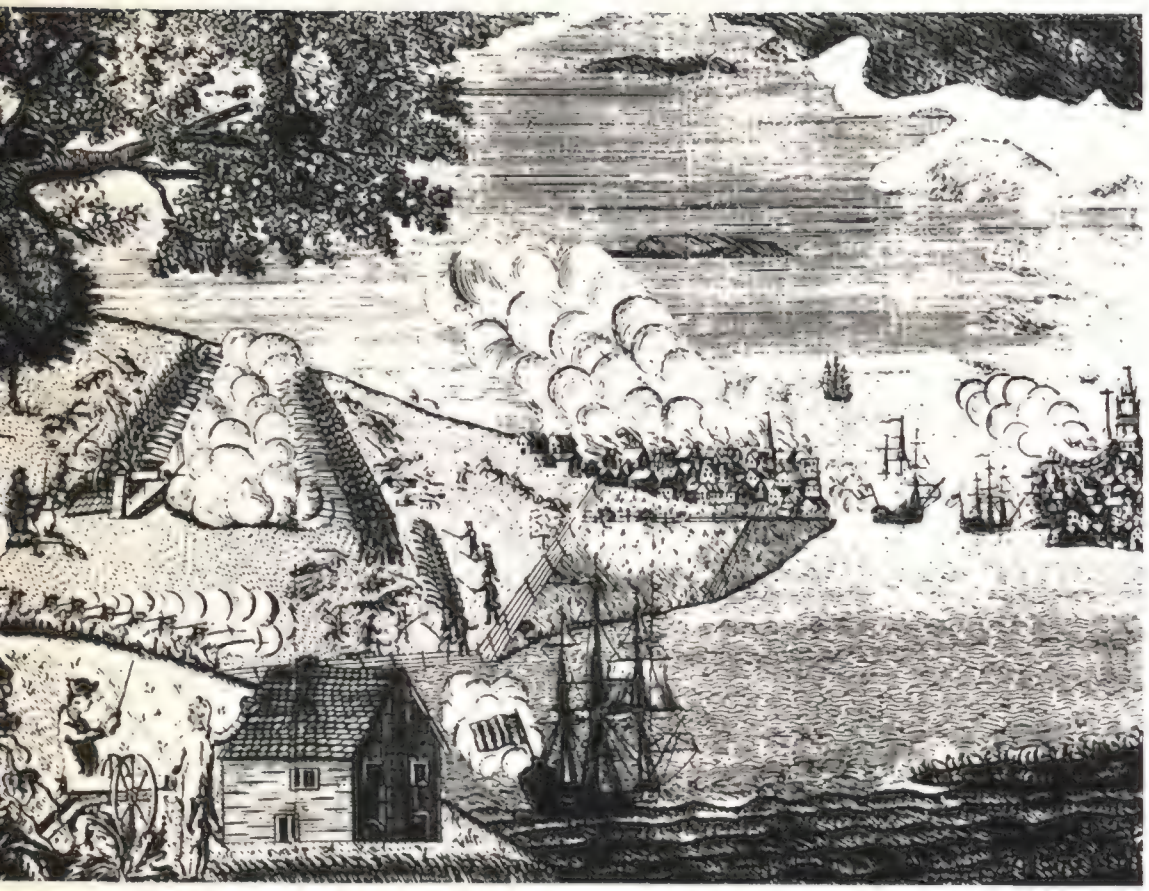
Newsboy exhibit sketches a street "profession" that dates from the 1830s.

Real-life New York newsboys of the early 1900s fought for street corners and hawked their "Hextries."

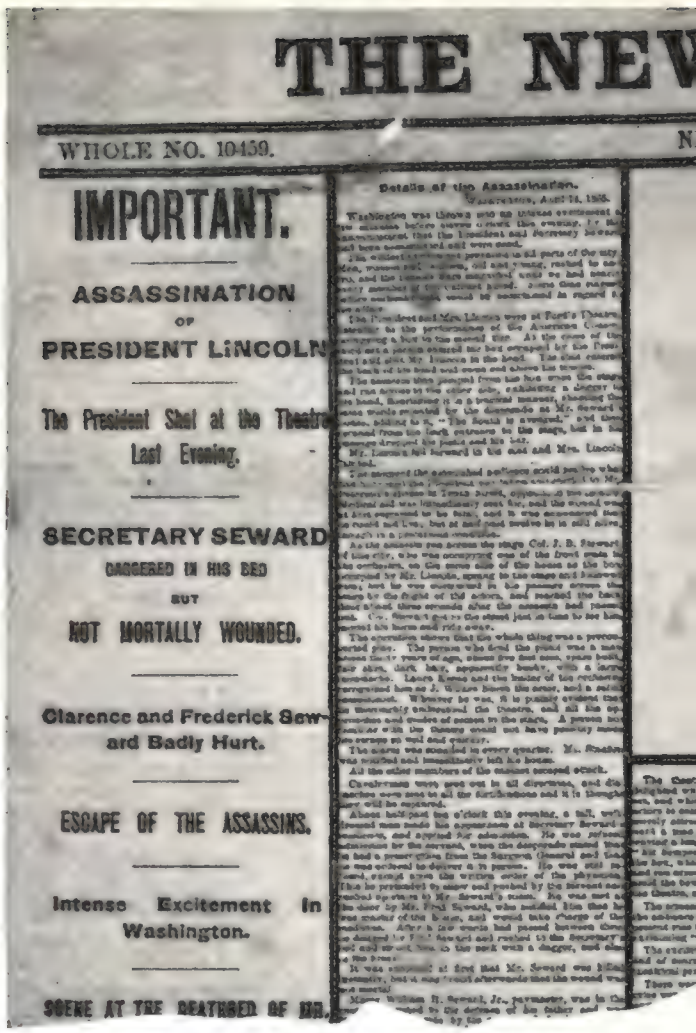
Our transcontinental telegraph was completed in 1861 in time to carry Civil War news, as cartoon suggests.

Battle-scarred "Cher Ami" carried messages during World War I.

Rival reporters race to get a hot story on the wire. Telegraphic news speeded up the process of journalism.



"A Correct View of the Late Battle at Charlestown" (Bunker Hill), drawn in September 1775, is an early example of picture journalism. Colonial papers rarely used line engravings except for advertisements.



THE NEW

WHOLE NO. 10459.

IMPORTANT.

ASSASSINATION OF PRESIDENT LINCOLN

The President Shot at the Theatre Last Evening.

SECRETARY SEWARD DAGGERED IN HIS BED BUT NOT MORTALLY WOUNDED.

Clarence and Frederick Seward Badly Hurt.

ESCAPE OF THE ASSASSINS.

Intense Excitement in Washington.

SCENE AT THE DEATHBED OF MR.

Details of the Assassination.

'The Times does not soil the breakfast cloth.'
—Adolph S. Ochs, 1896.

Ochs Saves Failing N. Y. Times

The death knell had sounded for the New York Times when Adolph S. Ochs bought it in 1896. He set out to rebuild it with solid news coverage and calm refined editorials. By World War I he had reestablished its national reputation.

Ochs entered the newspaper world in 1869 at Knoxville, Tenn., as an 11-year-old newsboy and printer's apprentice. By the time he was 20 he was owner and publisher of the Chattanooga Times.

Fascinated with communications technology, particularly the wireless, Ochs assisted many inventors and explorers who were seeking faster news-reporting systems.

The *Times* suffered from sticking to words while New York's *World* and *Journal,* both strong on pictures, passed the million mark by 1898. By then, Ochs was speeding up the transmission of news.

W. R. Hearst's political hopes inspired cartoon of "inaugural dinner" with

Coverage of Lincoln's assassination had all the facets of modern reporting.

News wagon, called most complete ever built, would open for counter sales, lock up tight at night.

Katzenjammers, Jiggs, Happy Hooligan and others from Hearst "funnies."

Joe Gibson, toting his hand-cranked camera, proved there was romance aplenty in newsreel journalism.

Text and photographs by Tor Eigeland

Wildlife thrives in the Marismas, Spain's marshes

Two-thirds of these thousand-square-mile wetlands grow rice, but the rest still harbors a variety of European birds and mammals

Mongoose, a pet of the wildlife station, drinks at a pool. It is native to Africa and southern Spain.

One of the few great wildlife sanctuaries left in Europe has been saved from the plow, from the relentless Spanish building boom and from overhunting. In the course of the last 50 years, two-thirds of the Marismas, roughly 1,000 square miles of marshes along the Guadalquivir River, south of Seville, have been devoured by ricefields. The original plan was to drain the rest of the area for more rice.

I asked Dr. José Antonio Valverde, one of the principal forces behind the salvation effort, what would have happened if the Marismas had been dried up by the Ministry of Agriculture. His answer: About 75 percent of the birds that rest in the Marismas while migrating from Western Europe to Africa would have disappeared. Among birds that spend the winter instead of moving on, the Scandinavian geese would have disappeared completely and many other species would have been greatly reduced. This area is one of the most important winter havens for northern European birds. In fact, half of all the bird species in Europe can be seen here during their migrations.

Doctor Valverde, along with like-minded Spaniards, the Council of Scientific Research and the World Wildlife Fund, went to battle for funds to buy up as much of this threatened land as possible. In 1964 the Estación Biológica de Doñana was created, and five years later, the Parque Nacional de Doñana was officially established, with Dr. Valverde as director. This national park consists of an untouchable 131 square miles—marshland (Marismas) and a bit of adjoining drier land, the Coto Doñana. Now at least the survival of some of the species of wildlife that thrive there is assured. Some landowners still have hunting rights in the Coto Doñana, but the Spanish government controls the region.

The afternoon sun was glaring out of a blue spring sky when I arrived there. The whitewashed villages, the olive and eucalyptus trees along the road south from Seville to the Coto Doñana, could just as easily have been somewhere in North Africa. Donkeys and mules ambled along, lazily pulling carts behind them. Marismas farmers on horse or mule trotted up and down the road. They wore headclothes in the Arab style, topped by a cap. When I later had the opportunity to ask one of them why they wore the scarves, he replied: "We always have. I would feel naked without it." The Moors departed 500 years ago, but they left a great deal behind.

Where the dirt road enters the Coto Doñana there is a locked gate, to its right there is a sand dune. In the sand dune, near some steps leading to the guardhouse, there is a tin can. In the tin can there is a key to the gate. All this is set forth on a sheet of instructions.

I found the tin can, but the key was not in it. Quite a long time later the guard found me, asked for my permit to enter and, with imprecations for the previous visitor, dug up a spare key. Since it had taken nearly an act of God to obtain the permit to enter, I felt as exclusive as the guests of the Dukes of Medina Sidonia who ran the Coto Doñana as a private hunting preserve for 500 years.

The 16th-century hunting palace no longer looks like a palace. It is a rambling old building which has

Because they can become pests, importation of pairs of some species to the United States is restricted.

Warden Antonio Romero holds a man-raised fox. A regional native, it runs wild but returns to its cage.

been added to and renovated many times. It now serves as a guesthouse for scientists and other visitors who have a good reason for being there. Nearby, on the edge of the marshes, stands a new white building which houses the labs and a large observation room with one-way visibility windows, a couch and some easy chairs—the only touch of real comfort in the park.

While waiting for the game warden who would provide transportation, I strolled about the grounds which are shaded by enormous eucalyptus trees. In a cage I found a mongoose who came running over to the wire screen when I called. I stuck a finger in and he proceeded to nip me. His partner then came running over and, as if to apologize for this ungracious welcome to the Coto, rolled over and rubbed himself against my finger. I scratched his rough, dark, furry back and was rewarded with a pleased purring, almost like that of a cat.

In the next cage—a very large one—a huge tan cat with brown spots was sprawled behind a bush. It turned out to be an uncommunicative lynx who, for just a fraction of a second, glanced indifferently through me. Then the rumble of an approaching engine startled him. It was my transportation—a tractor —with the warden aboard. He jumped off, shook hands and asked "Are you an ornithologist?" I replied that I was not. He looked pleased. "Well, then, I can tell *you* a few things, Señor."

For the next day and a half we bounced and sloshed around the park on the tractor. The Coto Doñana itself consists of open scrub, stone pines, tall eucalyptus trees, cork oaks, semiconnected lakes and sand dunes. "The big flooding here occurs during the winter," the game warden told me, "but it starts with the rains in fall and lasts through spring. In summer everything changes. The Marismas dry up. Cars can drive through where now you need a horse or a tractor to get through the water. Fish—carp—are devoured by vultures, herons and many of the other animals while trying to find a stream leading to the Guadalquivir. The heat is terrific!"

From my tall perch behind the driver's seat I saw wild boars, turtles, lizards, mongooses, lots of red and fallow deer, and birds, birds, birds. Being spring, it was the nesting season, and we had to take great care not to come too near certain trees. If you scare them away from their nests they may never return again, and they may not find another place to nest.

We passed two cork oaks loaded with the nests of herons, spoonbills and young egrets. Not a leaf was left on the trees. The warden pointed out that acidity from droppings was killing them. "It's a problem here because we are running out of cork oaks."

Off in the distance we spotted the nest of an imperial eagle. As we watched, one of the birds took wing and soared quickly out of view. Valverde told me that there are only about 50 pairs left in Spain, and scarcely a dozen here in the Coto Doñana. Each pair needs a huge, undisturbed area to itself—about three square miles—and there are few such places left.

Valverde said that the government is also trying to protect the black vulture. Spain has roughly 100 pairs

Norwegian-born Tor Eigeland is a free-lance writer and photographer whose work has appeared in many national magazines. He lives near Barcelona.

Herons and spoonbills nest in a cork oak in
the Coto Doñana, dry-land adjunct of the Marismas.

left, some in the mountains of Huelva not far from the Marismas. Valverde is interested in acquiring funds to buy up this "sierra" and make a preserve for them that would be complementary to Coto Doñana. "But we never have enough money," he adds, ruefully.

We made one swing to the southern edge of the Coto and found ourselves among Europe's largest sand dunes. Beyond the dunes lies a long stretch of beach on the Atlantic, from Huelva on the west to the mouth of the Guadalquivir. The beach is outside park limits. From the sand dunes we could not see the ocean, but we could hear an ominous droning—heavy construction machinery.

Valverde told me that this signaled the building of a development which will eventually house about 80,000 people, with another housing project for 70,000 planned at the mouth of the Guadalquivir. This beach is the last unspoiled stretch left along the coast. The noise, drainage of fresh water and pollution from the project will have a bad effect on the park, and Valverde would like to have it stopped on the grounds that it is in violation of national policy.

"We want to take over all the coast adjoining the park," Valverde says. "Newspapers and TV programs have recently been for us, and there is a small national movement afoot, started independently by schoolchildren in Bilbao, to collect enough money to buy the beaches. This kind of thinking is relatively new in Spain. And it is a good sign."

Wading wolf, six months old, is tame as a dog. It came from Spain's mountains where wolves still exist.

Brave bulls, strolling through the Marismas, assure that these broad wetlands are indeed in Spain.

Awakened by a friendly deer

On the morning I was to leave the Coto Doñana for the center of the Marismas I was awakened by something soft nudging me. Startled, I stared into the curious eyes of a little doe that had strolled into my bedroom. This friendly animal had been abandoned and later found by the majordomo of the hunting palace and was reared on a baby bottle. Since we had not even been introduced, I had to push her out of my bedroom so I could get dressed.

Someone from the office of the Estación Biológica de Doñana in Seville guided me along the endless *muros* —retaining walls that one can drive on when it is not raining—into the heart of the Marismas, where they run a little scientific observation station, the Laboratorio Leo Biaggi.

From the top of the last bit of wall, about a mile away through water, reeds and mudflats, I could just barely make out a small white house. My guide said, "Well, there it is. If they see you they will come and get you with horses. If not, you will have to walk. Good luck!" He turned his car around and started back toward Seville, leaving me about as alone as I have ever been. Since dusk was approaching, I left most of my

A spotted lynx is comfortably caged at the headquarters of the Parque Nacional de Doñana.

Legions of toilet bowls for housing project border the area, but such polluting development is resisted.

gear in the car I had driven out, slung a couple of cameras over my shoulder and started walking. Every few feet a duck or a coot or some other bird scrambled out of its nest, complaining loudly. Each time I was easily as startled as the bird.

Near the halfway point, and almost up to my waist in water, I spotted a herd of brave bulls looking at me. At about the same time, I remembered someone telling me that there were water snakes in the marshes—I could not recall whether they were supposed to be poisonous or not. It was nearly dark. Just as I decided to turn back, I saw someone on horseback leading another horse and coming my way; it was like seeing your best friend after years of separation.

The sky was a dark, flaming red by the time we reached the Laboratorio Leo Biaggi. Ramón Coronado, a young forestry engineer, was leaning against the fence surrounding the station. "Look!" he exclaimed, "Flamingos!" Far up in the sky a flock of perhaps 30 flamingos moved rapidly in constantly changing formations and directions as if looking for something, then suddenly seemed to make up their aggregate mind and moved off toward the west. Other flocks of birds drifted out of the sky to settle down in the swamps for the night. Never had I seen or heard so many birds in one place.

In the morning visibility was a lot better, but there was practically nothing to see except a carpet of bulrush, sedge, salicornia and a farmhouse about five miles away. The sand dunes along the coast and the Coto Doñana with its pine groves could barely be made out in the distance beyond a vast, luxurious, flat expanse of nothing. Then—looking a little more closely—you realize that there is hardly a patch of sky where you cannot see a bird, sometimes very far off, sometimes close by.

Ramón Coronado and I walked into the Marismas. Again, waterfowl—geese, avocets, mallards and coots burst out of their nests squawking bitterly. Coronado went over to the abandoned nests, made notes and carefully covered the eggs with down or straw to leave them less exposed to the rats, hawks, crows, magpies and mongooses that feed on them. "I am studying the nesting of birds, gathering as much data as possible. I check the date of the laying of the eggs, the size, the number, how many are fertile, the time of incubation, the weight of the eggs and also of chicks. We also try to calculate how many are destroyed by animals or insecticides."

Dr. Valverde told me that nothing has been done here about insecticides. A study of the insecticide problem is being made with the cooperation of a Dutch group and the findings are being analyzed. The trouble is not so much that insecticides enter the park —although they do to a certain extent through water and air—but that many birds leave and feed outside the park where insecticides are employed on a massive scale. "We suspect," he added, "that the parents of two young black vultures we are bringing up on the Coto were poisoned by insecticides. We found several vultures dead in their nests, still covering cold eggs."

Ramón Coronado has an almost mystical faith in marshes and swamps. "I think the conditions of life are very, very easy along marshes and for that reason almost all ancient civilizations flourished in such areas. There are lots of eggs to eat, millions of birds, and plenty of fish in shallow waters. For this reason it seems important to save areas like the Marismas. Without holding onto these natural wild areas that we evolved from, we would surely be on the wrong track." He sighed. "We need many more Valverdes in Spain."

Young black vulture was saved from insecticides which killed parents. Species is very rare in Europe.

Book reviews

Life: The Unfinished Experiment
S.E. Luria
(Scribner's, $7.95)
The Survival of the Wisest
Jonas Salk
(Harper & Row, $6.95)

As a rule, young scientists work at science and older scientists philosophize about it. These two slim volumes are in that mold: two elder statesmen of science, Nobel laureate S. E. Luria and Jonas Salk, who needs no introduction, trying to tell the lay public what modern biology tells us about our past and our future. But the resemblance ends right there; the two use different approaches and get different results. Luria does more than he set out to, and Salk does somewhat less.

Luria set himself an apparently simple goal, to provide the lay reader with a basic explanation of evolution and genetics—deeply rooted in facts. Most of his book is pure explanation—of the mechanisms of evolution, of the molecular operations of the genes, of the functioning of cells. The explanations are extremely condensed, and only rarely does Luria take time to discuss the broader meaning of scientific facts.

On the face of it, this does not sound promising. Books about biology on the elementary level are a glut on the market, and one might wonder why a Nobel laureate spent his time writing yet another one. But these well-known facts, seen through the lens of Luria's genius, take on new significance and increased meaning; the logic of evolution, of genetics and humankind's present plight is set firmly in context and is brilliantly illuminated. By the time Luria reaches his surprisingly optimistic conclusion—that "blind evolution has operated with subtle wisdom" by imprinting in the human brain "an intrinsic program that opens to him the innermost sources of optimism"—the reader is likely to agree, and to understand why he or she agrees. Parts of the book might be tough going for those with no background in biology and too primerish for scientists but, overall, it is a book that is essential reading for almost anyone.

If Luria's subject is biology and his weapon is fact, Salk's subject is metabiology and his weapon is assumption. Salk says that we are moving from one epoch of human existence to another and that the forces now directing human evolution favor the rise of a new kind of human being, the "wise," one who is attuned to the needs of the new epoch, as opposed to the "unwise," who is still living in the old epoch. The basic need, Salk says, is for education that will enable an individual to achieve "a life satisfying to Man yet not at cross-purposes with Nature."

This may sound vague in outline, but it is also vague at full length. Salk is free with his metabiological concepts, his italics and capital letters, his dichotomies and assumptions, but he is stingy with his facts and downright niggardly with specific proposals for reaching his goal. Many readers are likely to finish the book in hazy agreement with Salk but in puzzlement over the facts of metabiology, especially because Salk seems to invent those facts to fit his theories.

Old or young, scientists still seem to do their best writing when they stick to the facts of science.
—*Edward Edelson*
Science Editor, *New York Daily News*

Toms, Coons, Mulattoes, Mammies & Bucks: An Interpretive History of Blacks in American Films
Donald Bogle
(Viking, $12.50)

In his book, *The Negro in American Fiction,* Sterling Brown postulated that the American writer has defaulted in portraying the black man in fiction. Inevitably, Brown wrote, the black man is seen as the contented slave, the comical and happy-hearted buffoon, the brute or the tragic mulatto. To him, the complexity of human existence is denied.

Donald Bogle, in his humorous and perceptive book, reveals that such labeling is also pervasive in American films. This "interpretive history" analyzes the roles in which blacks have appeared in a decade-by-decade account. As the title suggests, one finds that the black actor has been restricted to playing five kinds of parts—the same stereotypes that Brown found in American fiction.

Bogle, however, goes beyond this labeling and directs us toward the actor, the person interpreting the part. The best of the black actors, though restricted and boxed in by someone else's fantasy, broke free and put a personal stamp on an impersonal figure. Stepin Fetchit did this as

In the all-black musical film *Carmen Jones* (1954), Dorothy Dandridge (center) enjoys a night on the town with Pearl Bailey and Diahann Carroll.

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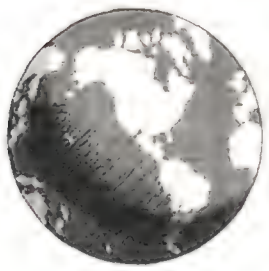

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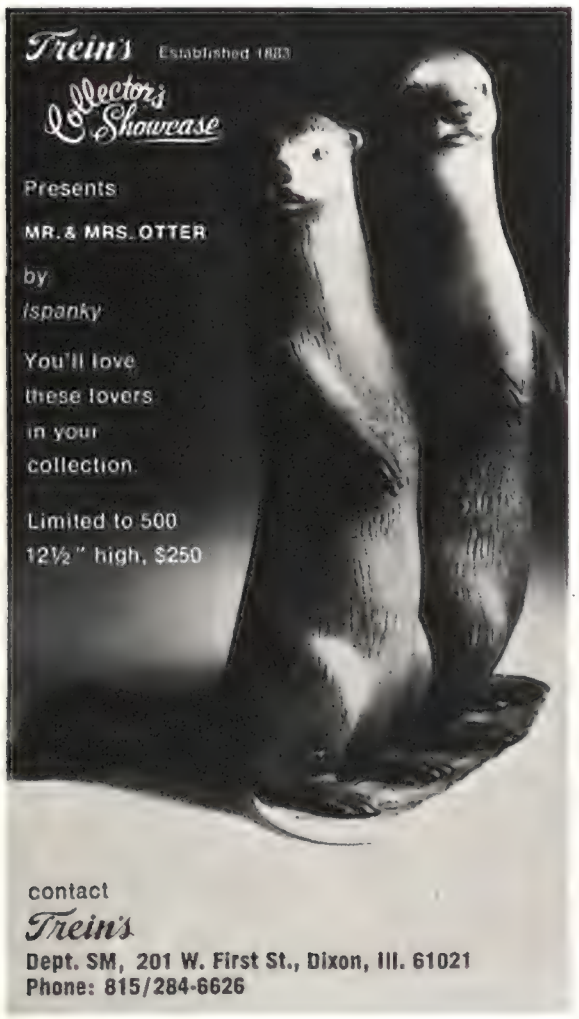

well as Hattie McDaniel. It is the results of their efforts that the author would now have us appreciate.

One of the most interesting and informative chapters in the book concerns itself with independent black film producers during the 1920s, 30s and 40s. The paucity of material on this subject renders this chapter invaluable. I only wish that the author had developed it further.

But, to be fair, his concern is with the actor and the roles he plays. And in this area, Bogle has written authoritatively—and with zest.

—Phil W. Petrie
Executive Editor, HowardUniversityPress

The Morro Castle: Tragedy at Sea
Hal Burton
(Viking, $7.95)

On a sluggish summer day in 1884, the editor of the Asbury Park, New Jersey, *Daily Spray* was groping for inspiration to fill the space on his editorial page.

His attention turned to the frothy Atlantic, sweeping the beaches of his resort community. And a thought seized him. "Asbury Park needs a shipwreck," the *Daily Spray* announced. "We need a first-class shipwreck. Why? To make Asbury Park a famous winter resort. She should strike [the beach] head-on, and we could accommodate her all winter. . . . Atlantic City would then yield place to Asbury as a peerless . . . resort."

Just 50 years later, fate obliged with one of America's greatest maritime disasters. Belching fire and smoke, the pilotless hulk of the cruise ship *Morro Castle* struck the beach almost head-on near the city's Convention Hall. Asbury Park's tourism was booming even before all the bodies had washed ashore.

The Morro Castle: Tragedy at Sea by Hal Burton is a vivid account of the unbelievable string of human and technical failings that conspired to bring the flaming leviathan aground at Asbury Park. Though nearly four decades have passed, much of what actually happened on the *Morro Castle* remains a mystery.

The day was September 7, 1934, and the Depression and repeal still hadn't knocked the bottom out of the "whoopee cruise" business. The 508-foot *Morro Castle,* "one of the safest ships afloat," was New York bound on the last leg of its 174th round trip to Havana.

On this night the *Morro Castle* had been pursued up the coast by a storm of hurricane force. Dissension was rife among the poorly paid and weakly commanded crew. Early in the evening, the captain was found slumped over his bathtub, dead of a heart attack. At 3 A.M., just 20 miles south of the entrance to New York harbor, a fire of dubious origin broke out amidships. Within minutes, "the *Morro Castle* was a floating torch."

Of 318 passengers, 86 died. Of 231 crew members, 49 were lost. The disparity, to mariners with a tradition of putting passengers' lives first, was inexcusable.

The author was one of the many newsmen who covered the tragedy and its aftermath. His book is a carefully written narrative that obviously took much hard research. Most illuminating are the accounts of survivors that Mr. Burton doggedly tracked down and interviewed.

If this were fiction, the many first-person accounts of escape, rescue and inhumanity would challenge the reader's credulity. But this is history, and a commentary on social interaction at a time of chaos. The reader is left with a chilling awareness of the horror the passengers faced as they plunged alone into the raging Atlantic.

—Stephen Green
A weekend sailor and press aide to U.S. Senator Alan Cranston

The President's Wife: Mary Todd Lincoln
Ishbel Ross
(Putnam's, $8.95)

Into this richly documented portrait of our most tragic First Lady—and to some the most interesting—are painted both the warts which marred her personality and the dimples which enchanted such diverse suitors as Stephen A. Douglas and Abraham Lincoln.

Ishbel Ross, noted for her biographies of American women, recounts the pros and cons which shaped the reputation of Lincoln's controversial wife.

Oddly enough, the cons are startlingly vivid to those of us who began to read about Mrs. Lincoln only after the Lincoln Papers were opened and historians began to study them in the late 1940s. Scarcely a kind word was believed about her before then.

Miss Ross shows that some of the ugly rumors about Mary floating around Washington during the Civil War were based on facts.

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To list a few of the cons on Mrs. Lincoln's scorecard during her White House years is to note that she meddled in state affairs probably more than Abigail Adams was accused of doing, and thought her judgment was often better than Lincoln's when it came to people. She detested many members of her husband's official family and was vocal about it (especially Andrew Johnson and General Grant). She ran up a debt of $70,000 for clothes about which Lincoln knew nothing, and had public temper tantrums that embarrassed her husband mightily.

Was she incipiently insane even then? Miss Ross traces her erratic behavior back to the death of her mother before Mary was seven. One of many great scenes in the book takes place in the Chicago courtroom where Mrs. Lincoln, not knowing why her son Robert wished her to accompany him there, sits silently to hear herself convicted of insanity and sentenced to an asylum.

Probably the best scenes of all, however, tell of Mrs. Lincoln's arrival in Washington and of the female competition she was up against during her early White House parties. Miss Ross, having written biographies of Washington hostess Kate Chase and Confederate spy Rose O'Neal Greenhow—both then in full operation—and of Mrs. Jefferson Davis (then on her way South), knows the cast of wartime Washington better than most and uses her knowledge effectively.

One might call this book the *complete* Mary Lincoln, except that Miss Ross ventures that Mrs. Lincoln probably left behind more letters, which may show up later. The Lincoln story, in all its high drama, may go on forever.

—Christine Sadler
Author of *America's First Ladies*

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"Ukiyo-e" is a special exhibition of this unique, 16th-century school of Japanese painting. Including more than 100 paintings, it is the first of three shows planned to commemorate the 50th anniversary of the Freer.

Renwick Gallery
"Form and Fire: Natzler Ceramics 1939-1972" is a collection of 100 pieces by Gertrude and Otto Natzler, who are known for the combination of simplicity and perfection in their ceramics.

"Arts and Crafts Movement in America, 1876-1916" presents 300 decorative art objects, including furniture, glass and leatherwork (see May SMITHSONIAN).

National Portrait Gallery
"The Black Presence in the Era of the American Revolution, 1770-1800" is a major exhibition of portraits, prints, broadsides, petitions, poems and letters demonstrating the influence of blacks in the founding of this country (see pp. 52-57).

Smithsonian Commons
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California Coast: Investigate the architecture and history of Hispanic California along the spectacular coast from Los Angeles to San Francisco; visit the missions and Morro Bay; take part in a special tour of restored homes in Monterey—September 16-23.

Sea and Shore Laboratory, Charlotte Harbor, Florida: Using the facilities of the Mote Marine Lab, participate in ongoing research problems concerning birds and shallow-water animals; discover the nocturnal sights and sounds of low-tide shore life at midnight; join a cookout on an uninhabited island—October 11-18.

Big Cypress Swamp and Everglades National Park: Explore and learn the natural history of these two very different regions in southern Florida; take a boat excursion through mangrove swamps and canals and observe the fauna, flora and unique birds of these areas—November 11-18.

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Foreign Study: Copernicus and eight other tours

Copernicus, Poland and Italy: In this 500th anniversary year of Copernicus' birth, revisit the scenes of the life of the man who revised our entire concept of the universe. Tour includes the Polish and Italian cities of Krakow, Frombork, Torun, Warsaw, Bologna and Padua—October 1-21.

Mexico and Guatemala: Historic sites of Yucatán, Oaxaca, Mexico City, Tikal and Antigua (depart and return Miami)—August 27-September 14. **West Africa:** Historic sites from Mali to Senegal—January 8-February 1, 1974. **India and Nepal:** Emphasis on architecture and museums—January 23-February 13, 1974. **Sites of Civilization:** Cruise from Rome to Athens—April 6-27, 1974. **Greece:** Sites and flowers in northern Greece and the Peloponnesus—April 27-May 12, 1974. **Ethiopia and Kenya:** Ancient and contemporary cultures from Aksum to Lalibela, plus several days in Kenya—May 23-June 14, 1974. **Black Sea Cruise:** Depart and return Athens—September 17-October 6, 1974. **Afghanistan and Pakistan:** Archaeological and historical sites—October 21-November 11, 1974.

For detailed information on domestic tours, write Mrs. Patricia Kilkenny, Room SI 106; for foreign tour information, write Miss Bliss Schumann, Room SI 123, both at Smithsonian Institution, Washington, D.C. 20560.

National Collection of Fine Arts
"Lilly Martin Spencer, 1822-1902: The Joys of Sentiment" is a retrospective of paintings, drawings and prints by this foremost American artist.

"A Measure of Beauty: The Diffusion of Style in Early 19th-century America" is a collection of 80 19th-century objects, including prints, drawings, watercolors, bandboxes, books and miniatures.

"Divergent Representation: Five Contemporary Artists" is the first NCFA exhibition organized by Walter Hopps, visiting curator of contemporary art. It focuses on the various directions currently being pursued by some American representational artists.

Division of Performing Arts
"Alice in Wonderland" continues at the puppet theater, Arts and Industries Building. Performances are at 11 A.M., 1 and 2 P.M., Wednesday through Sunday. For tickets, call (202) 381-5395.

Museum Summer Hours
Four Smithsonian museum buildings will be open from 10 A.M. to 9 P.M. each day through September 3. Included in this schedule are the History and Technology, Natural History, Arts and Industries and Air and Space buildings.

Parking on the Mall
Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of fringe parking areas and/or public transportation is recommended whenever possible. For current information, write the Smithsonian Associates' Reception Center.

Museum Reference Service
The Smithsonian Associates' Museum Reference Service is available to members traveling within the United States. Associates may write for a packet comprised of lists, by state, of many of our country's museums, galleries and historical sites. Brochures are included when available. Please specify the states in which you will be traveling. Allow at least three weeks for mailing. Write: Smithsonian Associates' Museum Reference Service, Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560.

Museum of Natural History
"Synthetic Crystals" is a comprehensive survey of man-made crystals, showing how they are made, what they are used for and how they differ from natural crystals (see June SMITHSONIAN).

Live ants, cockroaches, termites and spiders are among the delights of the Smithsonian "Insect Zoo." Visitors can observe biological aspects of these insects in natural, environmental settings.

Museum of History and Technology
The Henry R. Luce Hall of News Reporting features an audiovisual chronicle of the colorful history, important personalities and technological advances of American journalism (see pp. 74-77).

National Air and Space Museum, Arts and Industries Building
Bonestell Space Paintings: The first public showing of Chesley Bonestell's 27 oil paintings commissioned for Arthur Clarke's book, *Beyond Jupiter,* continues through Labor Day.

Associates' Events
Traditional West African dance and music will be presented by the widely known African Heritage Dance Company in the Baird Auditorium, Museum of Natural History—August 22, 7:30 P.M.

Traveling Exhibition Service
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Riverton, Wyo.—"A Children's World (II)" (Riverton Museum, Aug. 4-Sept. 2).
- Corvallis, Ore.—"Discovering Color in Nature" (Oregon State University, Aug. 4-Sept. 2).
- Pierre, S.D.—"Indian Images (I)" (South Dakota State Historical Society, Aug. 4-Sept. 2).
- Memphis, Tenn.—"The Phenomenon of Peter Max (I)" (Brooks Memorial Gallery, Aug. 11-Sept. 9).
- Nashville, Tenn.—"The American Artist and Water Reclamation" (Tennessee Fine Arts Center, Aug. 11-Sept. 9).
- Raleigh, N.C.—"Makonde Sculpture" (North Carolina State University, Aug. 18-Sept. 16).

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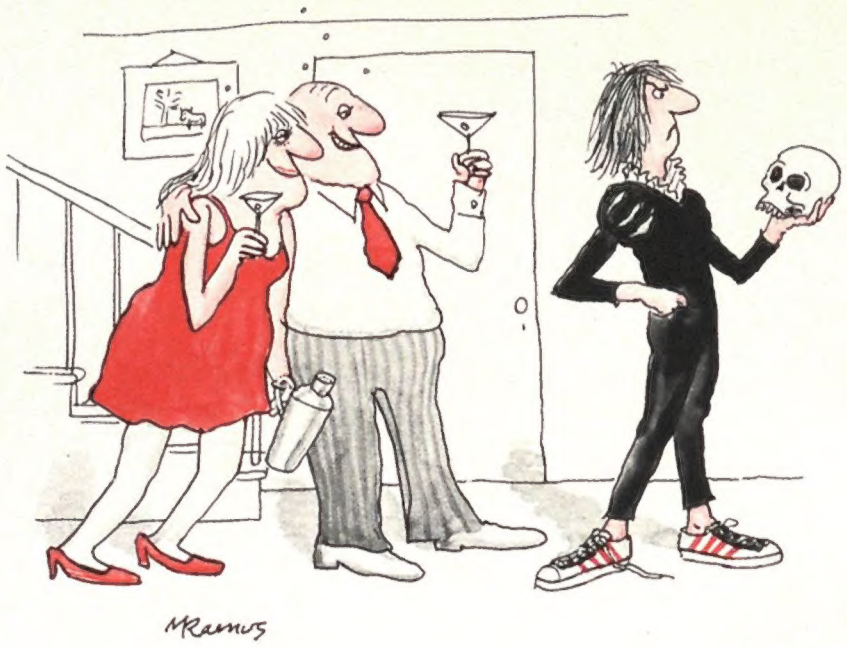
By Patrick Ryan

Spare the rod and spoil the muse



I know of no previous period in our evolution when procreation has been so burdened with social responsibility. Married couples are brainwashed into believing that a primary duty is to provide happy childhoods for offspring. "That many American parents feel inadequate for their role," observed Elizabeth Hurlock in *Child Development,* "is apparent in the frequency with which they seek advice from relatives, friends and child-guidance experts."

Thus Dr. Spock has challenged the Bible in the best-seller stakes and three feet of shelving in the average public library is filled with books telling parents how to keep kids happy. And though I have searched my local junior shelves, I have never found a single volume telling kids how to keep their parents out of straitjackets.

That childhood should be synonymous with happiness is nonsense. "The golden days of childhood," remark S. and L. Rosenzweig in *Child Development,* "as they appear in the conventional reminiscence of adults, are more consistent with fantasy than with fact." Just as well, too, if a child has literary pretensions, for a miserable infancy seems to provide a major impetus to later literary success. No storyteller can get much tension out of remembering an endless stream of happy days.

If poverty hadn't put his father into Marshalsea debtors' prison and set himself to child-laboring in that boot-polish factory, Charles John Huffam Dickens would have missed all the priceless experience of penury which gave us Oliver Twist, the Artful Dodger and Mr. Micawber. Mourning might never have become Electra, desire would have been absent under the elms and there would have been no long day's journey into night if Eugene O'Neill hadn't spent his formative years tagging along with parents tormented by infidelity, alcohol and morphine. If the Brontë sisters hadn't done their maidenly brooding in Haworth parsonage up on the bleak Yorkshire moors, surrounded by damp gravestones and plagued by chilblains, a doleful father and a reprobate brother, we'd be short a few classics today.

Great tragic writers thrive on great tragic childhoods. Feodor Mikhailovich Dostoevsky could never have chipped out his somber masterpieces of crime and punishment had he not been lucky enough to endure a boyhood with a dad so drunken in his dacha and so savage that his serfs finally murdered him. Moreover, adult wit seems to be keenly honed by infant agitations. What, we wonder, would James Thurber have achieved in humor without a youth beleaguered by eccentric aunts, mythically bursting dams, ghosts getting in and beds falling?

The literary roll call of unhappy childhoods goes on to include such money-spinners as Rudyard Kipling, who was brought up by unsympathetic foster parents; H. G. Wells, who was pitched out of a broken home at 14 to spend his adolescence sleeping under the counters of staff-sweating drapers' shops; Edgar Wallace, who was born out of wedlock and brought up as the 11th, but adopted, child of a London fish porter.

Let us all try a little harder to insure that our juvenile dependents get a fair chance of realizing their latent literary abilities. Let us get them after-school jobs slaving away in boot-polish factories. If at all possible, let us hit the bottle a bit more in their presence. When they shout at us, let us shout back, and remind them daily that W. C. Fields was dead right when he proclaimed that anyone who hates dogs and children can't be all bad. And let us make them sign cast-iron agreements putting their dear old parents on 50 percent of the gross from all rights in their future memoirs.

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